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# 1939

## Twenty-Five Years After

Except that another milestone has been passed on the Road of Life, there is likely to be very small feeling of regret on the part of any of our readers at the numbering of the year 1939 with the past. It has justified too completely the atmosphere of doubt and misgiving by which it was surrounded at the time of its birth. Of its predecessor, 1938, we were at least able to say twelve months ago that, although it had represented a period of difficulty, uncertainty, and apprehension—although there had been startling flutterings, caused by outbursts and squalls—the wings of the Angel of Peace were still spread over our beloved land. For even such an uneasy peace as held sway at that date, the country was thankful indeed. But when it was seen that, as the days went by, nothing occurred to cause a lifting of the threatening clouds—on the contrary, that the outlook became steadily more menacing—hope gradually faded, to be finally extinguished by Germany's ruthless invasion of Poland, which was followed (as there was no shadow of reason to doubt that it would be followed) by the declaration of war by Great Britain and France against Germany, for the second time in the lives of most of us. Since then, in varied circumstances and by many speakers, there have been explanations—some simple, and others not so simple—of our "war aims"; but the majority of us will probably feel no need to go beyond the plain and straightforward words used by His Majesty the King in a broadcast to his people on the very day that Britain entered upon war:

> "We are called, with our Allies, to meet the challenge of a principle which, if it were to prevail, would be fatal to any civilized order in the world. It is the principle which permits a State, in the selfish pursuit of power, to disregard its treaties and its solemn pledges; which sanctions the use of force, or threat of force, against the sovereignty and independence of other States. Such a principle, stripped of all disguise, is surely the mere primitive doctrine that might is right; and if this principle were established throughout the world, the freedom of our own country and of the whole British Commonwealth of Nations would be in danger. But far more than this—the peoples of the world would be kept in the bondage of fear, and all hopes of settled peace and of the security of justice and liberty among nations would be ended."

Great Britain—indeed, every corner of the mighty British Empire—will be content that history should judge it by its part in the events leading up to the grave September crisis in 1938. Before that crisis, and during the uneasy peace that followed it, almost superhuman efforts were put forth to prevent an outbreak of hostilities, but, alongside these efforts, the plainest of plain common-sense pointed to the necessity of re-arming at an ever-increasing speed—if not to succeed in guarding the peace, then to ensure victory in case of war. A lasting and honourable peace would have been worth any price; that the sacrifices made to attain it have been unavailing is matter for regret, and not for reproach.

## The Home Front

It was while Europe was steeped in this "uneasy peace" that an extraordinary year was ushered in. Extraordinary, not because matters proceeded day by day with ever-growing certainty towards the dreaded climax, but because of the number of respects in which related events have been at variance with what had been generally anticipated would be likely to occur in case of war. August 4, 1914-September 3, 1939. Twenty-five years after. The same essentials, but how different the attendant circumstances! On the first occasion, almost a bolt from the blue; the second, preceded by long drawn-out, wracking suspense. The earlier war gradually "lived into," as actual conditions arose; the later, extensively prepared against in advance, along anticipatory lines. With hope steadily diminished by the constantly increasing difficulty of closing one's eyes to the all too obvious significance of the multiplying signs and portents, people continued to go about their business as best they might until finally such small lingering doubt as might have remained was resolved on that fateful morning of the first Sunday in September, which, though its coming had been robbed of all element of surprise, was to change everything, almost at a stroke—to beckon death, to alter the course of life, to demand much of every one of us. For how long, who shall say? Thenceforward, until Europe is once again free from menace—and this time for a far longer period than twenty-five years—the struggle must go on.

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We have said that, almost at a stroke, upon the declaration of war, everything was changed, but one vital exception has to be noted. That is, the unswerving loyalty and unshakable unanimity of our people, which, in time of stress, must be accounted an incalculable asset. Gone are the old days of "flag wagging," and talk of the "glories" of the battlefield; there still remains the quiet, dogged determination that has so often borne British arms to victory in the past, and is able to do so again. Happily, such a spirit stands in no need of "boosting."

With action on the military front falling when the war began immeasurably short of all anticipation, the home front was heavily involved from the very outset. Orders, regulations, instructions, prohibitions, advice, and exhortations followed one after the other with bewildering rapidity. In fact, what we should be inclined to name as second in importance among the operations connected with the home front was set in motion even before war was declared. This was the evacuation of school children and others from what were regarded as danger zones, to areas of greater safety from aerial attack. This was a vital precaution, which affected some millions of persons. In point of numbers, London, of course, headed the list of places, but here, as elsewhere, the vast exodus proceeded with a smoothness that showed the thoroughness with which it had been organized. There is little need to remind our readers of the serious effects upon business which must be caused by large-scale simultaneous movements of population of this character; nor does it come within our province to discuss possible outcomes from the social point of view. A new method of warfare had to be faced; and new methods of facing it had to be devised. We count it fortunate indeed that such efficient preparation had been made in advance.

So far as the home front is concerned, apart from armament work, business has had much to discourage it; and here, again, it is only reasonable to expect that the effects will outlive the cause. The most important action on the home front, to our mind, is what has become known as the "black-out," which has produced countless disadvantages to set against the manifestly great advantage of rendering centres of population "unspottable" from the sky by night. In the present short days, the "black-out" operates over considerably more than one-half of the twenty-four hours; it renders going abroad after sundown always unpleasant, generally dangerous, and frequently fatal; it interferes with shopping; it shortens hours of work; and it cannot fail to have a depressing effect upon the spirits of the people. The immense work of the Gas Industry in the public lighting field used to be accepted as a matter of course; how enthusiastically would its resumption be welcomed now!

## An Economic War

There are many people who may be made slightly uneasy in mind, during periods of reflection, by the growing familiarity of the phrase, "Time is on our side." Modern warfare, in addition to being unspeakably terrible, is outrageously expensive. It has been authoritatively stated that this country alone is spending in this war at the very least £6,000,000 a day. Time is therefore a most expensive thing during a war of this scope. It may be argued that Germany can afford time far less than we can; but then Germany, possibly, is paying a smaller price for it than we are. Probably, as the weeks go by our expenditure will rise to even greater heights, and recitation of the multiplication table will become a disturbing occupation.

It seems that what we are now engaged in must become in increasing degree an economic war, and that, if complacency is permitted to flourish, the "writing on the wall" will be in figures. Nothing will ever destroy the will of our people in winning the war, but it may not depend upon them as to whether we win the peace. What is to follow upon the war? In spite of other preoccupations, this question must be kept always in mind, and as far as possible present efforts must be co-ordinated with plans for the future. In other words, the home front must be maintained at maximum strength. By various authorities it has been demonstrated that only by increased production and bigger exports can we ever hope to pay what seems likely to be the cost of the war. The last word will be with industry.

And industry has already suffered badly. In matters of finance, it is difficult to separate "business" and the "individual," and increased taxation affects both, whatever its nature. Thus the decision not to raise in last April's budget the standard rate of income tax or the National Defence Contribution was received with relief by all concerned with industry. But, as we now know to our cost, this was to be followed in September by a second budget for the year—a War Budget—which included heavy all-round increases in taxation. It raised the standard rate of income tax from 5s. 6d. to 7s. in the pound, made up of 5s. 6d. for the first quarter of the year 1939-40, and 7s. 6d. for three-quarters. "In a full year," said the Chancellor, "my plan is that the standard rate of income tax should be 7s. 6d. in the pound." This, of course, was not the only suggestion for providing more money in a budget that is bound to have serious repercussions. And that is not all. The individual has been sore beset by doubts as to how he should save or spend such money as may be left to him, though now the War Savings Campaign may be said to have mainly solved this problem. Industry, too, has experienced "head winds" from various other quarters.

But nothing must, and we feel that nothing will, daunt us. One Member of Parliament has even gone so far as to refer to "the 'humble taxpayer,' among whom the popularity of the Chancellor of the Exchequer appeared to increase with every shilling he put on income tax!" This remark may convey an exaggerated idea of pleasure, but it does not overestimate the doggedness of the peoples of the British Empire. None of us harbours a scintilla of doubt on this point. The fighting front is not going to lose the war, but all the sacrifices will have been in vain if the home front fails to perform also its part—and industry must have the most generous assistance, and the utmost possible freedom of action, if it is to overcome successfully the many obstacles which the circumstances create. Because it is vitally imperative that the industrial war, too, must be won, our faith in the future of gas is unimpaired. Although there is as yet little to show what 1940 may have in store for us, it does seem for the moment that wishes for a bright and prosperous year would be unduly optimistic. On this occasion, our wish must be of graver import: "Success on both Fronts!"

## The National Gas Council

A review of the work of the National Gas Council during the year naturally falls into two parts, for with the outbreak of war certain of the Council's normal activities were necessarily curtailed or suspended, and it was brought face to face with a large number of new problems and difficulties for which solutions had to be found with the least possible delay. Some of these difficulties had been foreseen and had been provided for, in so far as it was possible to do so without knowing the exact form which they would take. Others, and in particular those arising from the operation of Orders issued under the Defence Regulations, presented unexpected features necessitating rapid modifications in existing practice, and so called for immediate decision and action on the part of the Council.

Thanks to the plans for a possible emergency which had been carefully prepared beforehand and to the loyal observance by the Council and its individual members of the Regulations laid down by the Government, the difficult transition from peace to war conditions was quickly and smoothly accomplished. Since then the Council, either alone or in conjunction with others, has been able by negotiation with

the Departments concerned to secure modification of various regulations which in their original form operated unnecessarily harshly upon the Industry, as well as upon the public. These efforts to render the situation easier are being continued, but behind them all lies the determination, shared by the Council and all its members, to co-operate to the full with the Government not only in serving the community, but in doing everything within its power to help to bring the war to a speedy and successful conclusion.

## Legislation

Of purely peace-time legislation directly affecting the Gas Industry the output during the year has been small, and relatively unimportant. On the other hand, many of the measures passed by Parliament during the first eight months of the year, and designed to meet a possible emergency of the kind which has now eventuated, touched the interests of the Industry to a greater or less degree. An important example of this latter class was the Civil Defence Act which, introduced in March, received the Royal Assent on July 13. While the Act deals with Civil Defence generally, it contains a part which is devoted exclusively to public utility undertakers, and imposed upon them a variety of obligations which had to be carried out in view of the possibility of national emergency. All undertakers were obliged to report as to the routine to be followed in the event of an air raid, and as to the arrangements for the training of selected groups in first-aid, anti-gas, and fire-fighting.

The Board of Trade was also empowered to call upon them to report as to the measures taken to provide air-raid shelters and to ensure the due functioning of their undertaking during hostilities. Provision was also made for payment from public funds of part of the cost of the work rendered necessary by the requirements of the Government in regard to these and other matters.

The Bill in its original form contained a number of provisions which appeared to the Council unnecessarily exacting and onerous, but it was possible by direct negotiations with the Departments concerned, and subsequently, when the measure came before the House, by getting amendments put forward, to obtain alterations which made it less burdensome to undertakers without impairing its efficacy. While some of the provisions of the Bill affected gas undertakings only, most of them were of direct interest to all the members of the Conjoint Conference of Public Utility Associations, and the Council acted throughout in conjunction with that body.

The Finance Act, 1939, which also envisaged the possibility of war, incorporated a new tax known as the Armaments Profit Duty, which applied to any business which had obtained during the year total receipts from armament contracts exceeding £200,000. As a result of representations made on behalf of the public utilities an amendment was inserted in the Bill by the Government giving the Minister the power by order to exclude from the operation of the duty contracts for the supply of gas, water, and electricity. This tax has now been superseded by the provisions of the Finance (No. 2) Act, 1939.

The creation of a Ministry of Supply and the powers conferred on the Minister by the Ministry of Supply Act which received the Royal Assent on July 13, gave rise to some degree of apprehension. Thus, in the Bill as presented the Government would have had permanent powers to manufacture any articles which "in the opinion of the Minister of Supply would be essential for the needs of the community in the event of war." This very wide power was subsequently modified as the result of representations made by the Federation of British Industries on behalf of industry generally. Liable to affect the Gas Industry more immediately was the provision empowering the Minister to impose an obligation upon manufacturers to give special protection to their plant beyond that laid down under the Civil Defence Act if such special protection were considered vital in relation to the rearmament programme. To meet the cost of this special protection a Government grant of 5s. 6d. in the £ was to be made towards the capital expenditure involved, and as to the remainder it was announced that the Government would allow certain agreed additions to the contract prices in order to recoup the firms involved, the extent of the additions being dependent upon the proportion which the Government work bore to civil work. It was pointed out by the Federation of British Industries that repayments by means of additions to contract prices would be subject to income tax, and in some cases to Armaments Profit Duty, and would thus be rendered inadequate. This objection was in part met by a statement made by the Minister for the Co-ordination of Defence, but the position is not altogether satisfactory and is being watched.

## War Measures

With the outbreak of war came the immediate emission of a large amount of legislation in the form of Acts and Orders, many of which were of vital importance to the Industry. Indeed, so rapid was the output in the case of some Orders that they were actually in operation before the official texts were available. A very severe strain was thus placed upon the resources of the Council, which had not only to obtain the elucidation of doubtful points from overworked officials of the Departments concerned, but to keep its members informed of all developments, and to help them as far as possible with advice and information as to their position under the various enactments. It says much for the machinery created by the Council, and for the zeal of its members and officials, that it was possible to deal expeditiously and efficiently with the immense task with which it was confronted.

It is beyond the scope of this brief review to deal even in outline with all the war measures which in one way or another affected the Industry, and mention can be made only of the more important. Chief among them was the Fuel and Lighting Order, dated Sept. 2, made by the Board of Trade under the Defence Regulations. This Order provided that the supply of coal, gas, and electricity to all premises—save those which were in whole or part expressly exempted—should be limited to 75% of that supplied for consumption in those premises during the year ended June 30, 1939. So far as gas was concerned, the basic principle of the Order appeared so contrary to the interests not only of the Industry but also of the nation, that the Council through its President at once made representation to the Mines Department. It was pointed out that gas rationing, added to the automatic effect of war conditions, would have serious and perhaps catastrophic effects both upon the production of essential war materials, and also upon the conservation of fuel resources. Attention was also directed to the Introductory Memorandum to the Household Fuel and Lighting Order, 1918, in the course of which it was pointed out that there was a distinct national gain in consuming gas and coke in place of coal by reason of the fact that in the manufacture of gas a large number of valuable by-products—including materials for the making of drugs, chemicals and explosives—were produced.

Strong representations against the Order were also made on behalf of the electricity industry, and early in October a conference of representatives of the two industries was convened by the Mines Department, in the course of which it was suggested that they should discuss jointly the provisions of the Fuel and Lighting Order and the effective operation of any fuel rationing scheme, and report to the Department. This suggestion was agreed to by the Secretary for Mines, and a Joint Committee, which is fully representative of the two industries, was formed. Soon after the Committee had begun its work it was announced that on reconsideration by the Department of the rationing scheme for gas and electricity it had been decided to increase the permissible consumption from 75% to 100% of the quantities consumed in the year ended

June 30, 1939. This decision was naturally hailed with satisfaction, not only by those responsible for gas and electricity supply, but also by the public. The Joint Committee, while sharing this satisfaction, was, however, of the opinion, which was held by all whom they represent, that the proposal to ration gas and electricity at all was wrong in principle. It accordingly submitted to the Department a very full and carefully prepared memorandum on the whole subject, in the course of which it made agreed recommendations regarding the machinery of rationing and kindred matters.

Last week it was announced that the rationing of coal, coke, gas, and electricity is to be suspended for the present, but the Government are retaining the existing machinery, though in skeleton form.

## Coal and Gas Prices

The Fuel and Lighting Order did not directly restrict supplies of coal for gas-making, but many aspects of the coal position have called for the most anxious attention of the Council. Thus, the Coal Prices (Inland Supply) Order which authorized an increase in the price of coal by an amount equal to 1s. per ton has caused serious misgiving, not only because of the increase, but also because the Order allowed existing contracts to be set aside. In any event the Council consider that there was no case for an all-round increase in coal prices as many collieries were already making handsome profits.

Transport of coal both by rail and road has also suffered as the result of the operation of various Orders, and the Council has been in constant touch with the Departments concerned with a view to securing amelioration of the conditions. In particular, the requisitioning of privately owned railway wagons suited to meet the particular needs of individual undertakings has not only led to delays in coal deliveries, but to unloading and other difficulties which, in conjunction with the stringent lighting regulations and the abnormal working conditions obtaining on the railways generally, have presented many new problems and materially raised prices.

The increase in the cost of coal and other materials, the costs incurred under the War Risks Insurance Act, the expense, met in part only from public funds, of carrying out Government requirements in the matter of civil defence, and of the works undertaken to ensure continuity of supply in the event of damage by enemy action, the abnormal conditions of working and other factors have all contributed to render gas supply more expensive, and many undertakings have perforce had to raise their charges. Some general authority to raise the price of gas without the disadvantages attaching to such action in peace time has now, as the result of representations made to the Gas Administration Department of the Board of Trade, been recognized to be necessary, and on Dec. 2 the Defence (Gas Charges) Order, 1939, was made. The general effect of the Order, which is too long and complicated to be here summarized, is to permit gas undertakings within certain limits and subject to certain conditions to raise the price of gas without being subject to the consequences of such action which would normally follow in accordance with the provisions of the Acts and Orders under which they operate.

It is satisfactory to be able to report that despite all the handicaps from which it is suffering and all the difficulties which it has to overcome, the Industry has been able to meet to the full its obligations to the public, and is taking all the steps necessary to continue to do so.

## Mains and Cables

Turning from legislation it should be emphasized that though war-time conditions necessarily tend to overshadow other matters, the Council, in the exercise of its normal functions, was able during the earlier part of the year to carry out much useful work on behalf of the Industry. One of the most notable results of its efforts taken in conjunction with the Conjoint Conference of Public Utility Associations was the highly satisfactory report of the Joint Select Committee set up by the Minister of Transport to consider and report upon what is commonly called the question of Mains and Cables in Highways. The appointment of the Committee was due in part to the unsatisfactory position (of which the Ministry was kept informed) created by the failure of the highway authorities and the public utilities to arrive at agreement despite protracted negotiations regarding the points in dispute between them. It was also no doubt due in part to the fact that in virtue of the Trunk Roads Act the Minister of Transport is now himself a highway authority, and therefore directly interested in having the position regularized. The case for the public utility undertakers was prepared with meticulous care by the Mains and Cables Sub-Committee of the Conjoint Conference, and was submitted, supported by oral evidence, to the Joint Committee by Counsel.

In the Report subsequently made by the Committee it was laid down that the principle which in their view should determine the incidence of liability for costs incurred in removing mains and cables where such removal was rendered reasonably necessary by a highway or bridge reconstruction was that such costs should be borne by the party which initiated the proposal to effect the alteration of a highway necessitating the removal or alteration of the apparatus. This would almost invariably be the highway authority.

The Committee considered that the same principle should apply in the case of bridges, though they recognized that the grounds for throwing the expense on public utility undertakers were stronger than in the case of ordinary highways. The case for exceptional treatment put forward both by the London Highway Authorities, and by the four main line Railway Companies together with the London Passenger Transport Board, was in each instance rejected, the Committee considering that the same principle should apply to them as to highway authorities in general.

The Committee expressed agreement with the suggestion that legislation should be introduced to modify the highway provisions of the Clauses Acts, but, recognizing that such legislation could not be immediately forthcoming, recommended that in the meantime it would be desirable to incorporate in Bills and Orders promoted by statutory undertakers provisions giving effect to their recommendations.

The importance of the Committee's findings from the point of view of the public utilities represented by the Conjoint Conference is obvious, and though owing to the ban on Private Bill and Special Order legislation practical effect cannot now be generally given to them, they will prove of great value as and when such legislation becomes possible.

Another matter which was to have been investigated by a Parliamentary Committe—this time a Select Committee of the House of Lords—chiefly concerned holding companies, though the terms of reference were sufficiently wide to cover all public utility undertakers. A considerable amount of work was involved in preparing the case for gas companies, but the outbreak of war has led to the Committee being adjourned *sine die*.

## Rating and Income Tax

As usual the Council has had to deal with a number of rating matters, and in particular with certain questions arising from the extension of the present quinquennial period. Certain rating authorities, possibly misled by a circular from the Ministry of Health regarding the compilation of provisional valuation lists, regarded themselves as entitled to carry out wholesale reassessments of public utility undertakings with the intention, notwithstanding the postponement

of the quinquennium, of giving effect to them at once. In many cases there were no special circumstances which could justify such reassessments, and it was decided to fight a test case. The case selected was that of the Isle of Thanet Gas Company to which, as to other public utility undertakings in the County, the Kent County Valuation Committee, alleging that the existing assessment was unfair, had made vague proposals as to its amendment. The case was heard in the High Court and was decided in favour of the Company, the judgment of the Lord Chief Justice making it clear that a rating authority should not make vague and indefinite proposals designed primarily to extract information, but should in the first place ascertain that a *prima facie* case exists for a revision of an assessment. The decision has proved useful in areas other than that to which it applies, but to rectify the position generally amendment of the existing legislation is necessary. In the meantime the Government has announced that it intends to take steps to secure postponement of the date of operation of the valuation lists which would normally come into force in April, 1941.

With regard to income tax, the Council has been in negotiation with the Inland Revenue with regard to a revision of the agreement made in 1912, in respect of the depreciation of the plant and machinery of gas companies. These negotiations related to the following matters:

(1) A revision of the 1912 agreement in order to bring it into conformity with modern Finance Acts.

(2) The increase of the existing rates of depreciation allowed in respect of gasholders, meters, stoves, and cookers.

(3) The depreciation of plant and equipment used in connexion with public lighting.

(4) The suggestion that in addition to the existing agreement there should be an optional alternative agreement under which annual wear and tear rates would be taken in respect of plant and apparatus in lieu of the existing system of taking renewals on plant and apparatus other than gasholders, meters, stoves, and cookers.

(5) The annual wear and tear to be allowed in respect of various plant and apparatus at present subject to renewal claims.

(6) In addition to these matters, negotiations have been carried on with regard to the interpretation of Section 15 of the Finance Act, 1937, which relates to the depreciation of buildings containing vibrating machinery.

During the whole of these negotiations it has been understood that the Inland Revenue will make no attempt to override the existing practice under which all expenditure in connexion with services and fittings is allowed as a deduction from revenue. The deliberations have been prolonged, but it is hoped that in the near future complete agreement will be reached with the Inland Revenue on the matter.

Other matters with which the Council has been called upon to deal might be mentioned, but enough has been said to indicate the great range of subjects covered and the vast amount of work involved in doing so.

It will be remembered that the Council was formed after the last war, the need for a representative body having been abundantly shown by the difficulties experienced by gas undertakings at that time. During the intervening years the Council has grown rapidly in strength and importance, and now that war has again supervened the Gas Industry is to be congratulated in having brought into being an organization which, while it cannot obviate the effects of war-time conditions upon its members, can do much to mitigate them, and to prevent a repetition of the deplorable results to the Industry which followed the last war.

## Amalgamation and Grouping

While the war has led inevitably to a slowing down of amalgamation and grouping within the Gas Industry, some measure of activity in the merging of contiguous undertakings with a view to co-ordinating manufacture and supply was noticeable during the earlier part of the year.

To touch first upon the operations of holding companies, there have been two notable additions to the South-Eastern group in the acquisition of majority holdings in the Hornsey and Lea Bridge Gas Companies, serving between them more than 70,000 consumers in the greater London area. The South-Western Gas and Water Corporation have added the undertakings at Glastonbury and Launceston to their holdings in the west country. The temporary arrangement whereby the Central Administration of the United Kingdom Gas Corporation undertook the management of the South-Western Gas and Water Corporation was terminated by mutual agreement on Nov. 1. The two Corporations are now operating independently, and a Central Administration Office for the South-Western group has been established at Bristol.

The United Kingdom Gas Corporation have taken under their control during the year the gas undertakings at Louth, Royston and Brodsworth, Princes Risboro', and Morley—the last-named being amalgamated with the Corporation's subsidiaries at Drighlington and East Ardsley to form a single distributing unit between the eastern and western arcs of the West Yorkshire Gas Grid. Details of the organization of this new statutory subsidiary—the West Yorkshire Gas Distribution Company—were given at the Annual Meeting of the United Kingdom Gas Corporation last May. The grid thus formed is to link up 18 undertakings controlled by the Corporation in the West Riding of Yorkshire and draw supplies from existing gas and coking plants, and also from a new coking plant which is being erected by the Hemsworth and United Kingdom Coke Oven Company, Ltd., in which the U.K. Corporation have a 40% interest. The mains of the West Yorkshire Gas Distribution Company, which vary in diameter from 10 in. to 24 in., cover a total distance of 75 miles.

Another subsidiary of the United Kingdom Gas Corporation, the Runcorn and District Gas Company, has acquired the Ellesmere Port Gas Department, the combined undertakings to be known as the West Cheshire Gas Company. An addition to the British Gas Light Company's associated concerns was foreshadowed in the Special Order for which that Company applied to enable the transfer to them of the Horsham Rural District Council's gas undertaking at Billingshurst. The Churnet Valley Gas Company—a subsidiary of the Gas Consolidation group—opened negotiations for the acquisition of the Cheadle U.D.C. Gas Department.

Among a number of amalgamations and groupings either effected or intended by individual gas undertakings may be mentioned the taking over by the Huddersfield Corporation of Holmfirth, New Mill, and Netherthong, while the Wellingborough Gas Light Company applied for permission to absorb the Wollaston Gas and Coke Company, which supplied an adjoining area. In June a bulk supply to Calne was inaugurated by the Bath Gas Company, following the purchase by that Company of the Calne Corporation Gas Undertaking —7½ miles of trunk main being laid in the remarkably short time of just over six weeks. The Newcastle-upon-Tyne and Gateshead Gas Company are negotiating for the acquisition of the Morpeth undertaking, while a Special Order has been granted to the Middlesbrough Corporation to enable them to take over the Stokesley Gas Company.

Additions to the Sheffield Gas Company's already extensive area of supply are contemplated in the application for a Special Order to authorize the transfer to the Company of the Eckington and Mosborough Gas Company and the Killamarsh Gas Light and Coke Company. The Keighley Gas Depart-

ment have also sought sanction to a merger with the gas undertaking of the former Haworth U.D.C.

Based on the latest available returns, the aggregate gas output of the undertakings absorbed or taken over in the aforementioned acquisitions is not far short of 3,000 million cu.ft.

## The Institution of Gas Engineers

The membership of the Institution has again increased and now stands at 1,773 compared with 1,700 at this time last year. The Institution has lost by death one Honorary Member and 14 Members. The death of Professor Arthur Smithells was deeply regretted by his fellow members and many friends in the Gas Industry. He had been associated from the outset with the co-operation between the Institution and Leeds University.

The 76th Annual General Meeting held in London from June 6 to 9 was marked as the Murdoch Centenary Meeting. A Murdoch Memorial Lecture was delivered by Dr. E. F. Armstrong, F.R.S., and the meeting was attended by delegates from a large number of Overseas Gas Associations, including the President of the International Gas Union, Herr Hermann Müller (Dessau), two past Presidents of the Union, Monsieur A. Baril (Paris) and Herr Fritz Escher (Zurich), and representatives of the Belgian Association of Gas Engineers, the French Association of Gas Engineers, the German Association of Gas Engineers, the Netherlands Association of Gas Engineers, the Norwegian Association of Gas Engineers, the Polish Association of Gas and Water Engineers, the Swedish Gas Works Association and the Swiss Gas and Water Association. It was also a pleasure to welcome in addition a number of overseas visitors, including five from Australia.

An added interest to this Murdoch Centenary Meeting was the publication of a Symposium, "The Gas Industry Overseas," describing the origin and development of the Gas Industry in ten countries overseas.

The attendance at the Meeting was a record, almost 2,000 members and guests being present. The business sessions were well attended and the Papers gave rise to interesting discussions.

The Institution Gold Medal was awarded to Mr. F. B. Richards, M.B.E., the H. E. Jones London Medal to Mr. E. V. Evans, O.B.E., the Institution Silver Medal to Mr. J. E. Blundell, and the Institution Bronze Medal to Mr. W. S. Hubbard.

At the termination of the Meeting Mr. George Dixon (Nottingham), Senior Vice-President, was elected President of the Institution, Sir Frederick J. West, C.B.E., J.P. (Manchester), became Senior Vice-President and Mr. R. W. Hunter (London) was elected Junior Vice-President.

The social functions were well attended, some 1,100 Members and guests attending the President's reception at Grosvenor House, and the works visits in and around London and the visit to the President's Undertaking at Bristol and to Weston-super-Mare were greatly enjoyed by all taking part.

A new precedent in the Annals of the Institution was established this year by the holding of a Special General Meeting on the evening of March 14, to which members of the Coke Oven Managers' Association and of the Institute of Fuel were invited, when a Paper by James Jamieson and W. J. Skilling on the "Deterioration of Coal on Storage" was presented and discussed.

Owing to the war the 11th Autumn Research Meeting of the Institution, which was to have been held on Nov. 21 and 22, had to be postponed indefinitely. The following Reports and Papers have, however, been published and written comments on them have been received:

5th Report of the Research Executive Committee; 1938-39. (*Communication No.* 216)

44th Report of the Joint Research Committee of the Institution and Leeds University. Combustion Characteristics of Town Gas.—Part IV. The Aeration Test Burner (Model B.). (*Communication No.* 217)

30th Report of the Refractory Materials Joint Committee. (*Communication No.* 218)

16th Report of the Gas Education Committee; 1938-39. (*Communication No.* 219)

Institution Gas Research Fellowship Interim Report; 1938-39. The Inflammable Ranges of Ethylene-Air Mixtures at Atmospheric and Reduced Pressures and the Influence of Small Amounts of Nitrogen Peroxide thereon, by J. S. Forsyth, B.Sc. (Institution Gas Research Fellow) and D. T. A. Townend, D.Sc., Ph.D., D.I.C. (Livesey Professor). (*Communication No.* 220)

Some recent views on Factors Affecting Flame Velocity, by D. T. A. Townend, D.Sc., Ph.D., D.I.C. and M. Maccormac, Ph.D. (*Communication No.* 221)

The Influence of Pressure upon the Water-Gas and other Equilibria, by G. Sartori and D. M. Newitt, M.C., D.Sc., (*Communication No.* 222)

Some Observations on the Combustion Characteristics of Town Gas and its Constituents, by G. H. Fuidge, B.Sc., W. O. Murch, M.Sc., A.I.C., and B. Pleasance. (*Communication No.* 223)

Corrosion by the Products of Combustion of Town Gas under Conditions of Condensation and Re-evaporation, by J. W. Wood, M.Sc., and F. Taylor. (*Communication No.* 224)

This would have been the last Autumn Research Meeting at which the research work sponsored by the Institution would have been presented to the Council by the Research Executive Committee, for, as already announced an autonomous Gas Research Board has now been set up and at the request of the Council of the Institution has undertaken, *inter alia*, to direct and control the research work for which the Council of the Institution has hitherto been responsible. It is intended, however, that the Institution should continue to hold an annual Autumn Research Meeting at which Technical and Research Reports and Papers would be presented and discussed. A Bibliography of the research work conducted by or on behalf of the Council of the Institution during the past thirty years was published at the end of the 5th Report of the Research Executive Committee.

The Discussion on Heat Insulating Materials, arranged by the Joint Committee on Materials and their Testing, which was to have been held in conjunction with the Autumn Research Meeting and for which the Institution was to have acted as host, had also to be postponed, but it is hoped that it may be possible to hold the Discussion at some future date.

The Institution had again agreed to co-operate in holding a session at the Public Works, Roads, and Transport Congress and Exhibition which was to have been held at the beginning of November, 1939. Although the Congress Council had to cancel the Congress it has published some of the Papers which were to have been read, including "Tar Carpet; Some Theoretical and Technical Considerations," by G. H. Fuidge, B.Sc., South Metropolitan Gas Company. This Paper would have been presented and discussed at the Institution's Session of the Congress.

The Institution has continued its co-operation with various Government Departments. Early in the year the Home Office published the Fourth Report of the Departmental Committee on Lighting in Factories (before which Committee representatives of the Joint Lighting Committee of the Institution gave evidence) and the Joint Lighting Committee prepared in co-operation with the British Commercial Gas Association a booklet entitled "Light in Industry" dealing with the recommended minimum standards for general lighting of factories. The recommendations of the Departmental Committee have not yet, however, become statutory.

A representative delegation from the British Gas Industry, led by Mr. W. J. A. Butterfield (London), attended the Plenary

Meeting of the International Commission on Illumination at Scheveningen, Holland, in June.

The Gas Works Safety Rules Committee of the Institution during the year drew up, after consultation with the Factory Department of the Home Office, a new Gasholder Record Sheet to comply with Section 32 (2) of the Factories Act, 1937, Over 8,000 of these sheets have been supplied to gas undertakings.

Both prior to and again on the outbreak of war the Institution placed its services and its research organization at the disposal of the Government Departments with a view to securing the supply of materials of national importance produced by the Industry and of assisting with any technical problems that may arise. Such assistance has already been given in several directions. The Institution has also co-operated in the compilation of the National Service Central Register of the Ministry of Labour, in which the majority of the members of the Institution have enrolled.

## Education

Records of the number of candidates sitting for the examinations of the Institution since 1924 show that for the first six years the increase in the number of both external and internal candidates coming forward each year was steady. Then from 1929 to 1932 the number of internal candidates continued to increase with a big jump in numbers from 1931 to 1932. From 1932 to 1939 the number of internal candidates was fairly steady at about 320 except for a sharp jump of 53 in 1938, almost wholly due to an increase in the number of ordinary grade gas supply students. Correspondingly the number declined this year owing to a decrease of 39 in the same category. After 1929 the number of external students declined by about 50 to a total of 83 in 1931, but since then there has been a gradual but steady increase up to the present figure of about 150.

A closer analysis of the figures indicates that excluding the few who have entered the Industry direct from Universities, during the past eleven years there has been an average intake of approximately 90 students on the manufacture side and 120 on the supply side.

The number of candidates taking the Institution's Examinations this year was up to average. There were again satisfactory numbers taking the Diploma Examination in Gas Engineering (Manufacture) but there were only two entrants for the Diploma Examination in Gas Engineering (Supply). The Charles Hunt Memorial Medal for the Diploma in Gas Engineering (Manufacture) was awarded to R. A. Hudson (London).

The Third Annual Gas Education Conference was held on June 29, when a number of points concerning the Education Scheme were discussed.

## The B.C.G.A.

In the autumn of 1938 the B.C.G.A. embarked on an important national effort—the smoke abatement campaign. Designed to educate the public in the evils of smoke and to show how the problem could be solved by the extended use of fuels produced by the Gas Industry, this was both a prestige campaign and a sales getter. It associated the Industry, as no other fuel industry, in the public mind as the possessor of a practical and economical method of doing away with smoke and, as this idea continued to spread, it stimulated the sales not only of gas and coke fires, but of other appliances as well. That the public conscience was ready to be stirred over the smoke problem was shown by the widespread publicity given to the campaign in the Press. Editorials, leaders, cartoons, and paragraphs appeared in newspapers all over the country. In a long term campaign of this kind the effect is cumulative. It is therefore to be deplored that the outbreak of war has inevitably put a stop to the follow-up campaign on similar lines that was timed to start this winter.

The B.C.G.A. conducted a second long term advertising campaign during the year. This dealt with water heating and ran from April to June. A change was made from the O.D.B. advertisements of the previous year; the new advertisements were based on the question "what do you know about housekeeping?" and in a number of illustrated "catch" problems cleverly introduced the need for hot water in the home and showed how simply gas could supply it. A booklet, "Which of these Women's problems is yours?" was distributed in large quantities in support of the national advertising.

A short refrigeration campaign, and the usual "national fortnight" advertising respectively gas cookers and gas fires, completed the main advertisement campaigns of the year. The "national fortnight" repeated the success of the previous years. Gas undertakings all over the country supported them by local advertising, window displays, posters, and so forth, and were rewarded by increased sales of appliances.

Apart from these national campaigns, the Association up to the outbreak of war continued to advertise extensively in the trade Press and in the professional journals circulating among architects, medical men, &c. Industrialists were also served by the publication of two well-produced and informative booklets. Of these, "The Industrial Therm" covered in text and illustration the applications of gas to heat processes in various trades; and "Light in Industry" associated the regulations laid down by the Factories Act with the services of gas in the lighting of works and industrial premises.

An important part of the Association's services to its members is the preparation of advertisements, leaflets, and other publicity matter for undertakings' local use, and a considerable volume of work of this nature was carried out during the year. Naturally, requests for advertisements were considerably curtailed on the outbreak of war, but the B.C.G.A. has been called upon during the last few months to prepare a number of "goodwill" advertisements and others of an informative, rather than a "selling," type. It is satisfactory to be able to record that members' requests for publicity material are now showing signs of increasing.

Of the Association's own publications, beyond those already mentioned, there may be noted issues of "A Thousand and One Uses for Gas" dealing with such subjects as domestic science classrooms, hotels and boarding houses, hospitals, and canteens. Two outstanding issues during the year were "Servants of the Public," a review of the work of the Gas Industry in so far as it is allied to that of local authorities; and "A Town is Born"—a description of the huge L.C.C. housing estate at the White City. As one member put it, this last publication was "good subtle propaganda in the best manner of the B.C.G.A."

Several issues of "A Thousand and One Uses for Gas" in preparation at the outbreak of war had to be set aside as unsuitable for the changed conditions of living. The Association, however, has in hand a number of issues dealing with war time problems, some of which will be available shortly.

The Flambeau, the Association's excellent little propaganda magazine, did good work during the year. Among the subjects covered were the heating of Liverpool Cathedral, the Royal Kitchens and those at the House of Commons, the All-England Tennis Club at Wimbledon, and the house of the Chancellor of the Exchequer. The Flambeau as a piece of goodwill propaganda has an even greater usefulness in war time, when newspaper advertising is diminished; undertakings should find the war issues, which are continuing the high standard of the earlier numbers, a most valuable link between themselves and their consumers.

The Home Service activities of gas undertakings during the war will also be of great value in maintaining good relations with consumers. The work of the Association's Home Service

Department in collecting and collating information from all over the country, and its other services to members, have an important part to play in war as in peace time.

During the year under review, audiences totalling a million and a quarter saw the gas films. Here again, the war has caused the suspension of the normal programme and a reorganization to suit new conditions. Two films under production are being completed, however. One of these, "The Obedient Flame," is a neat piece of publicity for gas cooking. And a war-time programme of short informative films is being initiated. It is interesting to learn that there is a growing demand for films to serve the educational needs of the reception areas.

Exhibitions were, of course, cancelled at the beginning of the war, but in the earlier part of the year useful publicity for gas was obtained at a number of important exhibitions, including the B.I.F. (visited by H.M. the King, who inspected a part of the Gas Section and signed the visitors' book at the Gas Information Bureau), and the Ideal Home Exhibition (at which over 55,000 people saw the gas films in "Mr. Therm's News Theatre"). The Joint Gas Conference held at the B.I.F. under the Presidency of Lord Kennet was a most successful one. Its subject, "The Retention and Development of the Domestic Load," was one of great interest to the Industry, and the four contributions gave rise to a good discussion. The subject was further dealt with at some of the district conferences and again at the Annual Conference which took place at Brighton in April. Held under the able presidency of Mr. A. M. Paddon and addressed by Sir Harold Hartley, Lord Horder, and other distinguished speakers, this Conference was an outstanding success.

A department of the Association which has had a very busy year, both prior to the war and since its outbreak, is the Studio. Window displays to the number of over 2,000, posters to the number of over 27,000, and showcards amounting to 4,000 were supplied to undertakings during the year, and a considerable amount of special work was carried out to members' orders. On the outbreak of war, the Studio was quick to produce a topical display, and indeed was one of the first, if not the first commercial studio to do so. Window displays are another way in which undertakings can advertise to the public; their intelligent use in war-time will do much to maintain goodwill and to stimulate sales.

The Domestic Gas Salesmanship Discussion Groups were inaugurated in October, 1938. During the year 157 groups were formed. Further to strengthen the Association's education schemes, a quarterly magazine, the "Gas Salesmen's Newsletter," was produced. This set out to keep the salesmen *au fait* with the latest achievements of gas, as well as giving them up-to-date information on salesmanship. Unfortunately the war has led to the temporary suspension of these activities.

A note of the lines on which the war-time activities of the Association have been planned appeared in the issue of the "JOURNAL" dated Oct. 4. From this our readers will have been able to see that the B.C.G.A. has an important part to play in the reorganization of the Gas Industry to meet present-day problems. Though war may restrict national advertising schemes, the Association's value to the Industry in helping it to maintain good consumer relations and to inform and educate the public on all developments of gas, should increase.

## The S.B.G.I.

At the Annual Meeting of the Society held in May, Sir Francis Joseph was elected President and Mr. Ernest West was elected Chairman. The retiring President delivered an Address devoted primarily to the subject of co-operation between the gas and coke oven industries, a subject of live concern to both Industries, and one on which Lord Ridley was particularly well qualified to speak in view of his close association with one of the largest and most progressive gas companies in the country, and one of the most important undertakings in the coke oven industry. He evidenced also his great interest in industrial research, requiring as it does the closest co-operation between university, research committee, and industrial producer and user, Lord Ridley being personally associated with important groups in each of these categories. Lord Ridley also presided at the Annual Dinner in the evening following the Annual Meeting, and it was gratifying to see the Society continuing as it has done for several years past to secure an even larger muster of its members and their friends than ever before. While it is possible to exaggerate, it is also equally possible to underestimate the importance of such a social occasion. There were many distinguished visitors present engaged in other walks of life, and they cannot have failed to be impressed with the spirit of comradeship and understanding which exists between all those whose work lies within the Gas Industry.

To write of the splendid display of plant and appliances to be seen at the Gas Section of the British Industries Fair at Birmingham in February, and to recall the appeal to the public of the gas exhibit at the Ideal Home Exhibition in April, seems strangely remote in looking back over 1939. But until the end of the summer former triumphs in such fields of activity were being emulated by the members of the Society and plans were being made through the Joint Exhibitions Committee of the British Gas Federation for a more co-ordinated, and so perhaps a more rational, conception of large exhibitions in the future. Under the spur of competition new and more attractive designs for gas apparatus and appliances were being produced, and more still were being planned. Money was being devoted consistently and in considerable sums to development work and research; the remarkable progress of the last few years was continually fostering the desire to do even better.

That seems no more than a true picture as seen at the end of the summer of the gas appliance industry, backed as it was by the continuous efforts of those engaged in the design and production of plant and equipment. In the course of no more than a week-end a completely new background emerged, and only gradually is a new picture taking shape. A great public appreciation of the services which the Gas Industry has to render has been built up with care, and with a great expenditure of effort and of money over a number of years, and that the tempo has been greatly accelerated in recent times is beyond question. In the first impulsive reaction to war, vivid as the events of 25 years ago were in the minds of those who had to plan to meet that contingency, more intimately as were the effects expected to be felt in the individual homes of the country, so were the demands for emergency measures to meet the emergency challenging. Looking back, clearly it could hardly have been otherwise, but perhaps at the outset the event fell most harshly in the Gas Industry on those firms within the Society whose business it was to meet the demands of a public avid for better service, expectant of new and better things always to come in gas appliances, on those firms whose business was ancillary, and on those gas undertakings whose areas of supply were immediately and seriously affected by a great exodus of consumers.

## The Immediate Problem

Those thus affected among the Society's members are experiencing times of not inconsiderable difficulty. It is, however, their expectation and that of the Industry as a whole that none of the possibilities based on past good work which were before them earlier in the year will be finally lost, and that once peace returns the Industry will reap the fruit of them all. But the immediate problem remains. Labour forces once lost are not easily or quickly restored. Firms which have concentrated all their loyalties on the Gas Industry have that Industry alone to which to look, unless it is possible for them to adapt some of their equipment and the skilled

labour at their disposal to war work. In many cases this is far from easy, and just at present the national capacity for work to which they could most readily adapt themselves is notably in excess of the demand. Taking the long view, however, the Industry when the war is ended will seek the services of these firms again in full measure so that as in the past its needs may be met and its requirements fulfilled as speedily and with as little dislocation as possible. Apart, then, from any sentiment it is no more than a sound economic policy to put forward every endeavour to maintain intact as working units the firms within the Industry. In these circumstances the broad policy of the Industry will surely be to continue to place such orders as are still available with the firms which have served the Industry well, and indeed further to give them every opportunity to satisfy such emergency requirements as there may be outside the usual run of gas plant and gas appliances.

Just as, however, during days of peace and intense competition the Industry developed a policy which placed the Gas Industry in the forefront as Public Servant No. 1, so during the period of war a policy must be evolved adapted to the needs of the times and the requirements of the public. It is no more than a truism to say that the evolution of such a policy brooks no delay, for as the public as a whole adjusts its outlook to new conditions, so must those who serve it be ready to meet, and, indeed, if the maximum of benefit is to be derived, to anticipate a new outlook which is now in some degree in process of crystallization. Drastic fuel rationing came and was later modified, and in many other directions are the controls on industry and on the daily life of the individual being relaxed. These signs are being watched in anxious expectation by those in all branches of industry who have been the severest sufferers in the last few months, and members of the S.B.G.I. who may see their order books running down are hoping that the initiative which has enabled them in the past to maintain continuity of operation will even in the altered conditions of to-day reassert its supremacy in the affairs of the Gas Industry. To expect the Industry to maintain 100% of its peace time prosperity during the war would be to expect the impossible, but "Business as Usual" represents an attitude of mind which has surmounted difficult days in the past. So long as gas is sold for domestic consumption, appliances must be made available to customers on the most convenient terms possible, and the view which the Society would stress is that the Gas Industry cannot afford to jeopardise by a too drastic suspension of its normal trading methods, including hire-purchase, its own goodwill or the functions of the appliance makers which are essential to its whole progress. It must also be realized that inevitably prices will advance. They are in fact hardly likely ever to come down below present levels, so that the Industry has nothing to gain and a lot to lose by withholding orders which can be placed in the immediate future.

The facilities which the Society offers have enabled contracting and manufacturing firms concerned to confer together where there has been a call for them to be ready to meet the special requirements of the Gas Industry's war time needs. There have been consultations with Government Departments in cases where the services of the Society have been required, or where, in the interests of the members, clarification has been sought of the application of emergency regulations and so on. Standard Conditions of Contract have been reviewed with The Institution of Gas Engineers and new clauses to cover new contingencies have been evolved. There have been interchanges of views regarding the possibility of adapting gas lighting to some modification of the present very stringent regulations. There has been co-operation in the work of the Central Register of the Ministry of Labour, and generally the Society has associated itself with representations which have been made to the Government throughout a wide range of matters of intimate concern to industry.

The affairs of the Society are being controlled by a small Emergency Committee and at a recent meeting, in reviewing the Society's activities, the opinion was expressed that as in peace, so in war, the Society has a very useful function to perform. Plans for the future need to be made with no less thought and imagination than in the past.

## Technical Developments

Let us take a glance now at the technical developments during the year. We had looked forward to the publication of the results of continued work pursued by the Institution and Leeds University on the high pressure gasification of coal. Owing to the war, these results, in the public interest, could not be made known. In the early stages on the laboratory scale the yields of products were remarkable and the flexibility of the process seemed to open up new vistas in the treatment of coal to give refined fuels in liquid and gaseous form. During the past year the research has been carried further on a somewhat larger scale, and it is unfortunate that war-time circumstances have not permitted the publication of the findings and explanation of any difficulties which may have been encountered, for there is a great deal of difference between the results gained on a small laboratory scale and those obtained when larger scale working is attempted. We are told that the manufacture of the necessary apparatus for a semi-technical plant is well in hand.

Much more work has been carried out during the past twelve months on the combustion characteristics of gas—work which should prove of very great help in maintaining a satisfactory gas service in times of emergency, when normal gas-making procedure may have to be modified and when conditions may necessitate sudden changes. Investigation during the year has thrown new light on the influence of changes in gas composition and properties on the performance of appliances. Several practical points have been established which will help gas undertakings to face, without undue disturbance to the consumer, wider variations than normal in gas composition and calorific value; and there is little doubt that the aeration test burner can provide the works engineer with a useful check on quality. By its use engineers should be in a position to know that if the aeration test burner number varies by more than a certain percentage either way from an average figure trouble may be experienced on the district. Regarding the effects of changes in composition of gas the main danger is from a fall in aeration test burner number leading to lighting back of appliances and noise. A rise in A.T.B. Number may cause a fall in efficiency and also incomplete cumbustion. It has been shown that to obtain a resultant town gas of given calorific value dilution by waste gas gives the least fall in A.T.B. Number, then producer gas, then blue water gas, and lastly carburetted water gas. There is a smaller fall in A.T.B. Number if the coal gas is debenzolized before dilution to the desired calorific value. These findings will prove of particular value in circumstances of emergency bringing about changes in gas composition due to efforts to meet increased loads, benzole washing, failure to obtain the usual supplies of gas-making coals, and possible deterioration of plant. During the year a new instrument—Model B—has been developed. It works on the same principle as the original model but is improved in mechanical detail, range, and performance.

The investigation was described in the 44th Report of the Joint Research Committee, and concurrently work has been in progress in the combustion characteristics of town gas and its constituents in the laboratories of the South Metropolitan Gas Company. The results formed the subject matter of an Institution Communication. The approach to the problem in this instance was on quite different lines and the enquiry was of a more fundamental nature. It was considered that test burners such as the aeration test burner, though possibly suitable for controlling the combustion properties of the gas output of a works, were unlikely to enable a detailed comparison of the relative values of different gases to be made. The aim was to find out what were the combustion characteristics of various gases, as distinct from evaluating empiri-

cally the effects of unknown quantities. The work is as yet in its preliminary stages and the information which has been obtained is insufficient for any conclusion to be reached as to the mixture of gases which, from the point of view of combustion characteristics, would form the most suitable town gas. However, the results already obtained indicate the possibilities of the method of approach. The method involves the analysis of "combustion" and "aeration" diagrams. By superimposing one diagram on the other a combined diagram is obtained which enables comparison to be made between different gases as regards their liability to backfire, blow off, or give luminous flames in bunsen burners. One of the findings is that in order to give flames of the same characteristics it will be necessary not only to alter the size of gas orifice for different gases, but also to adjust the supply of primary air. Burners will be required to be fitted with provision for the adjustment of both gas and air. What we need now is work to establish the connexion between the aeration test burner and the combustion and aeration diagrams.

## Carbonizing Plant

In regard to new carbonizing plant there has been the development of the W-D static vertical retort, which formed the subject of an Institution Communication presented at the June meeting. The underlying principles of the static vertical retort are very interesting. The aim was to associate the advantages of the intermittent vertical chamber with the advantages of the continuous vertical retort process as regards the extraction of cool coke and continuous steaming. The Communication gave the results of three years' work on a full scale experimental plant erected at Croydon. It was found that the retort gave a higher thermal yield of gas per ton of coal carbonized than either intermittent vertical chambers or continuous vertical retorts. As the calorific value falls the advantage of the static vertical retort in this respect increases. The density of the coke is intermediate between that of coke made in intermittent vertical chambers and that made in continuous vertical retorts. The calorific value of the gas made can be changed over wide limits without altering the carbonizing cycle and without substantially modifying the volumetric gas output per retort per day.

We have not heard a great deal about complete gasification during the year, though a recent Paper dealt with a single stage process of complete gasification, worked, however, as partial gasification plant. In one of the trial runs recorded the coke extracted per ton of coal charged to the plant was 8 cwt.; in the other it was 5½ cwt. The calorific values of the gas produced were 414 B.Th.U. and 383 B.Th.U. per cu.ft. The economics of the process would have been different when operating on a complete gasification cycle. It was shown once again that, though large volumes of gas per ton of coal can be produced by the complete gasification process, without the sale of coke the cost per therm rises, and that if this gas requires to be enriched with oil the cost per therm again soars.

The results have also been set out of the working of new tower purifiers at the Wandsworth Gas-Works. They, too, were given in a Paper to the Institution which described in full the details of construction of the plant, the working of the plant, capital cost, and financial aspects from both the capital and the economic points of view. The plant has a nominal capacity of 10 million cu.ft. of gas a day. It was stated that the process cost per therm of gas purified by the new plant will be well under 50% of the cost of dealing with the gas by means of the original purifiers.

A notable discussion on gas purification took place in Manchester early in the year at a conjoint meeting of several technical bodies. One of the Papers submitted showed how the small works as well as the large can take advantage of the oil washing process for the reduction of organic sulphur compounds in gas and how it can be carried out with only partial benzole recovery. Another Paper dealt with the relation of tar fog removal to oxide purification and showed how the removal of tar increases the efficiency of oxide purifiers. The development of the Thylox process of liquid purification was discussed, as also was the mechanism of oxide purification.

Ten grains of sulphur and less per 100 cu.ft. should be the aim; and that this aim can be accomplished without technical difficulty and at no great works expense was demonstrated in a Paper later in the year by Mr. Norman Hudson. The results he gave of the working of an oil washing plant at Mirfield were wholly encouraging. The quality of the low-sulphur gas has opened up a wide field of usage, it has prolonged the life and reduced the maintenance costs of appliances and improved their appearance in use, and the operation of the plant has obviated troubles on the district.

## Weathering of Coal

Early in the year there was a special general meeting of the Institution at which Mr. Jamieson and Mr. Skilling presented a Paper on the deterioration of coal on storage—an excellent example of the value of collaboration between the Gas Industry and the Fuel Research Board. For the investigation twenty Scottish coals were selected. All the coals examined were of a rather weakly caking type and storage for even a short time would seriously affect their caking value. For coals of the type examined storage for 42 months is sufficient greatly to increase the net cost of coal per therm of gas produced, taking into account only the reduction in size of the coke available for sale. With coals having a sufficient reserve of caking power the effects may be slight even after four years' storage. Coals with a low caking power of 15 or less have too small a reserve of agglutinating properties to be able to produce a coherent coke after some comparatively short time of storage. Those with a higher caking index, 18 and upwards, have a larger reserve of agglutinating power, so that, although they do lose caking power on being stored, they may retain sufficient to produce a massive coke unless the period of storage is altogether too long. Summarized, the results of the work indicated that it is not desirable to place in storage coals of low caking index for use in gas production. The Authors concluded that it is not so much from the point of view of the quality of the gas produced, but the difficulties created in controlling the throughput of low caking coals containing large percentages of small size material. Coals of good caking qualities will give less trouble and yield a reasonably massive or coherent coke, but some knowledge of the capabilities of these caking coals to retain their caking properties should be available in making a selection.

## Motor Transport

Since the outbreak of the war naturally much attention has been focussed on the use of gas as a fuel for motor transport. In the "JOURNAL" for November 1, we set out an estimate of cost for a compressing station having two compressors of a working capacity of 100 cu.ft. of free gas per minute and a final gas pressure of 5,000 lb. per sq.in., each running 18 hours per day, 6½ days per week, and 52 weeks per year, with storage capacity for half-a-day's output of each machine. Capital costs, including compressors (£4,500), storage bottles (£5,500), and compressing station buildings (£1,000) would amount to £11,500. Capital charges, with interest of 5%, depreciation and maintenance on compressors at 15%, depreciation and maintenance of storage bottles at 10%, and maintenance of buildings, would amount to £1,850. Operating costs, with electricity at 0.8d. per unit, would, it was estimated, figure out at £2,778—a total of £4,628 a year. Assuming that the equivalent of one gallon of petrol is 1½ therms, the output of the plant would be 243,000 gallons a year. The cost of compressing per equivalent gallon would

work out at 4.6d., and if cost of gas per equivalent gallon is taken at 5d. per therm we get a total cost per equivalent gallon of 11.9d. In addition, of course, there would be the capital and depreciation charges on the vehicle equipment.

In regard to the use of low-pressure gas for motor transport, much has been done to assist automobile engineers. Of course, the amount of gas a bag contains allows of only a limited mileage range for the vehicle fitted with it, and it takes a considerable time for each filling. But it is a ready means by which cars can be kept on the road. The method is simple and the equipment required is inexpensive.

A word must be said, too, concerning the use of gas for stationary as well as mobile units. A high compression engine has been evolved which is identical in operation, except for a new type of carburetter, with the ordinary stationary diesel engine, and diesel engines can be converted quickly and without loss of efficiency to the gas-driven principle. A thermal efficiency of 40% compared with 26% previously with gas has been achieved. Gas has the ancillary advantages of eliminating fuel storage and lowering maintenance costs.

## Public Lighting

Several references to the growth of the street lighting load by gas were made at the annual meetings of gas companies reported in the "JOURNAL" during the early months of the year. Since 1921 the quantity of gas used for street lighting more than doubled. By this year it reached nearly 15,000,000,000 cu.ft. per annum, representing a considerable percentage of total sales. This increase was in the face of very severe competition, and was due to the fact that the Industry had developed equipment second to none in meeting modern peace-time requirements and had also developed the necessary specialized technique. The co-operative efforts of the manufacturers of equipment had in recent years established a highly efficient service from which gas undertakings throughout the country were gaining more and more benefit. The start of 1939 saw the Industry in a position stronger than ever before in regard to the lighting load.

In May came the publication by the Air Raid Precautions Department of the Home Office of "Wartime Lighting Restrictions for Industrial and Commercial Premises." It was stated that in the event of war a Lighting Order would be issued under emergency legislation imposing general darkening. Street lighting would not be permitted; the provisions of the Order would call for complete concealment, as a permanent measure, of all artificial lighting inside all buildings.

Time went on. Long-term contracts for public lighting continued to be secured by gas undertakings. Plans were made by the Association of Public Lighting Engineers for a conference to be held in Glasgow from Sept. 5 to 8. They were good plans, and, as previously, the manufacturers of equipment entered with enthusiasm into the scheme. It was intended that during the period of the conference the Gas Industry should concentrate largely on demonstrating in a practical way what it had to offer for lighting roads other than "main roads" as defined in the Final Report of the Ministry of Transport on Lighting. Excellent arrangements were made for showing the installations, without confusion, in a compact and typical area which would facilitate inspection. At two of the business sessions there were to be "Gas Papers."

Sept. 3—and the blackout, with its toll of lives, accidents, loss of trade, personal inconveniences. The public exercised patience. A joint committee of the Illuminating Engineering Society and the Home Office was set up without delay, and a special panel of street lighting specialists and physicists representative of both the gas and the electricity industries was appointed. The problem set to this panel was to afford the public the greatest possible amenity at night consistent with maximum safety from attack by enemy aircraft. The problem was easy enough to state but no means so simple to solve. It demanded the application of a new technique, and even the expert found it difficult to visualize the conditions imposed. Constant experiment was carried out, with the Air Ministry as the final arbiter.

A fortnight ago Sir John Anderson announced in the House of Commons that it had been found possible to devise a type of low intensity lighting which satisfied the Air Ministry—an announcement more than welcome to the public and obviously of the greatest importance to the Gas Industry, which supplies the illuminant for something like three-quarters of a million public lamps in this country. In the experiments which made this decision possible the Industry, including the manufacturers of equipment, played a conspicuous part.

The intensity of illumination envisaged is equivalent only to starlight on a clear night; its measurement is one of difficulty and nicety. The amenity value afforded by such a low intensity is, however, very great indeed. It will give pedestrians a sense of comfort and confidence, and motorists a dim but invaluable "frame of reference." The matter was referred to at length in the editorial columns of the "JOURNAL" last week, in which issue was published the draft British Standard Specification (A.R.P. Series) for Street Lighting under Wartime Conditions. This draft gave details of intensity and light distribution. New lighting units of approved pattern will be demanded. The demand will be immediate and heavy. But makers of gas lighting equipment have agreed virtually to pool their resources so that the demand for the new standard unit may be met as effectively and speedily as possible.

So the year ends, as it started, on a note of co-operation; and in coming months the public will have cause to be grateful to the Gas Industry for the measure of light it will be permitted to give.

## The Coke Market

Prior to the outbreak of hostilities gas coke in the London area was enjoying a strong position, and throughout the country generally substantial strides were being made towards co-ordination of the market. Various districts had begun to form themselves into associations, in most cases in conjunction with the coke oven producers. Indeed, the greater part of England had already been so co-ordinated, while Wales and Scotland were actively proceeding with the formation of coke associations. A Federation of Gas Coke Associations, whose object was to co-ordinate the whole of the district organizations, was also in process of taking shape. Thus, from the point of view of the policy and development side of gas coke, the position at the outbreak of war was very promising; and while it is anticipated that the war will exercise a retarding effect upon this development work, it will not by any means destroy the machinery which had been set in motion.

So far as coke exports are concerned, the International Cartel had largely succeeded—notwithstanding the difficult period through which it had passed—in effectively regulating the export trade; but due to its international character, the war has resulted in a suspension of the activities of this body. Coke exports are, of course, continuing, and to some degree are coming under the auspices of the export associations which had previously been formed as sections of the International Cartel. Under present conditions, however, the fixation of quotas and export generally have largely passed into the hands of those Government departments which deal with overseas trade.

The situation which has developed since the outbreak of hostilities has, of course, left its mark on the coke position just as it has affected most other commodities. In the first place, output has been reduced as a natural consequence of reduced gas consumption. This is chiefly noticeable in the evacuation areas, while the general self-imposed economy in fuel usage is to some extent offsetting any possible increases which might have been expected in other areas. If the condi-

tions now being experienced continue during the coming year it will mean that within the area of the London and Counties Coke Association alone—and it seems reasonable to anticipate this as typical of all districts—there will be a reduction in output estimated at something approaching half a million tons. From the point of view of production, therefore, present indications are that gas coke will be in somewhat short supply during 1940. In addition, a great deal of the coke which is imported south from the midlands and north might conceivably also suffer diminution as a result of the increasing demands of the steel and other major industries. A position is therefore likely to arise which will render impossible the normal development of the coke market which has been so assiduously cultivated in recent years.

The pre-war period witnessed a number of technical developments connected with the utilization of gas coke which have left a marked impression and which may well prove of value during the course of the war. These refer primarily to the use of fuel for agricultural purposes—not only for grass-drying, which has now become an established industry, but also for heating cattle houses and drying grain. It is also notable that the benefits of technical service and development in this direction have been recognized not merely in the Gas Industry itself but by the furnace coke producers as well. The latter were already instituting technical service bureaux on similar lines to that developed by the L.C.C.A., and it is a good augury that this work was proceeding on co-ordinated lines. Indeed, there were very healthy signs that not only from the commercial viewpoint, but from the technical and policy aspects also, the two major coke producing industries were working on parallel lines. For many years endeavours had been made to bring this co-ordination into an active policy of development, and it is only within the last twelve months that this desirable merging of interests has begun to take place.

## Merging of Interests

The "GAS JOURNAL" has consistently advocated co-operation in the coke market, and we are glad to see that this merging of interests is now materializing into active co-operation. We believe that the time has almost arrived when we can say there is little or no competition remaining in the coke market as between one gas undertaking and another; recent progress has reduced the loss of effort which always arises when there is competition between two bodies producing the same commodity. If we could see Scotland and South Wales falling into line with the remainder we could go further and say that no loss of efforts is taking place in the coke market.

Coke suffered equally with other fuels as a result of Government Orders, and it may be said that gas producers were being particularly penalized by the operation of the rationing Order, the framing of which led to the loss of direct business which cannot have been intended. Now that the rationing of fuel has been suspended, there is no doubt that many of these difficulties will adjust themselves as time goes on, although they must leave their mark on the post-war period. As matters have turned out, the fuel rationing Order proved valueless from the point of view for which it was initially devised. Fuel was in ample supply, and the Order only put obstacles in the way of the producers at home without any compensating beneficial effect. It has cost the country a great deal of money and created difficulties for consumer, merchant, and producer alike in the completion of forms and the clerical work entailed. Even when the original Order was modified to permit 100% consumption, the same difficulties were experienced and the same work required to be done. The complete suspension of fuel rationing will be welcomed by all, though it is emphasized that the need for economy still exists and the Government are still retaining the existing machinery. The extension of coke markets which would normally have taken place has thus been seriously curtailed—primarily because new building work, where central heating would have been employed, has been largely suspended, while new housing is not being proceeded with. The domestic and central heating markets are therefore relatively at a standstill.

The London and Counties Coke Association are making a helpful gesture to coke users in the sense that they are endeavouring to assist them to conserve their fuel supplies. This policy, in fact, is not a wartime measure, but the exigencies of the situation are perhaps demanding it more than would be the case in normal times. It has always been a sound part of the Association's policy to aim for the highest possible efficiency in coke utilization. To this end a new department of the Association was being brought into operation just prior to the outbreak of war which had for its purpose the development of a greater degree of automatic control in coke-burning equipment, with a consequent higher operating efficiency. This section of the Association's activities has, unfortunately, had to be suspended "for the duration."

Coke activation by the addition of soda ash is causing a great deal of interest in the Industry, and work of particular note in this connexion has been carried out by the Liverpool Gas Company on their well-known "Dryco" fuel. This Company is the only one which has put the process on a commercial scale, and the Industry will look forward to learning further details of the possibilities of this work in the not too distant future.

With regard to coke prices, there has, of course, been an inevitable increase to meet mounting production costs. But just as the co-ordination of interests through the various district associations maintains an equitable price level in time of peace, so has any violent price fluctuation been avoided in time of war. Such increases as have taken place, fully justified by existing circumstances, have been uniform, and have varied only to meet exceptional conditions in certain specified areas. It is gratifying to note that practically the whole of the country has been able to negotiate this price increase with one voice. The rise is a modest one—2s. 6d. per ton over the greater part of the country; 3s. per ton in the London and Home Counties area; and a higher price only in certain isolated areas such as the Isle of Wight and Cornwall where the transport of coal presents special difficulties.

The general situation is such that additional production is being pressed for on every side, and although the output of gas coke may suffer reduction, the gap may possibly be made up by greater production at the coke ovens. Pressure in this direction is being exerted not only to meet the requirements of the home markets but for the added requirements of the export trade.

## By-Products

Turning now to by-products. Home prices for sulphate of ammonia have remained the same as last season, up to the end of November. An advance of 8s. per ton has been agreed upon for December, and further advances will doubtless be made during the early part of the new year.

It was remarked in last year's review that although the costs of production had increased there had been no corresponding advance in the price of sulphate of ammonia. The fact is that every increase of price has to be justified not only to the Farmers' Union, but to the Minister of Agriculture and to the President of the Board of Trade. There have been sensible rises in the cost of bags, repairs and maintenance materials, fuel, wages, and sulphur materials for the manufacture of sulphuric acid since the war began. Moreover, manufacturers have suffered appreciably by the policy of the Government in persistently advising farmers, by wireless, to take advantage at once of the available supplies of sulphate of ammonia. This has resulted in substantial sales at the September-November prices, which are shillings below the normal January-March prices, but which, under the conditions that

may conceivably prevail next January-March, may well represent a difference of 15s. to 20s. per ton.

It is clear, therefore, that the advance that has been made, and any projected, are not in respect of ammonia as such, but are designed to cover the bare increases of manufacturing costs.

Large sulphate of ammonia manufacturers have been at much expense to make special provision for the storage of about 40% of their annual make, and it has been usual for them to accumulate stocks between August and January, so as to be in a position to meet farmers' demands during the season January to May. What has happened for the most part this year is that delivery of sulphate of ammonia has been taken almost as made, only to be stored in barns and farm buildings unsuited to maintain a dry and drillable quality in satisfactory condition. Thus, a big price advantage has been lost to sulphate of ammonia manufacturers, and the farmers are likely to be faced with difficulties in the drilling of their fertilizer later on.

In September last a Controller of Sulphate of Ammonia was appointed by the Minister of Supply. It is understood that he will interfere as little as possible between makers and their agricultural consumers or distributors. A home agricultural delivery charges equalization scheme has, however, been established, providing for the costs of delivery from producing works to farmer's station or wharf being pooled.

Further attention has been directed to the improvement of the quality of by-product sulphate of ammonia at gas-works and coke ovens during the year. Control of the physical and chemical conditions of the saturator have been outlined. For semi-direct and direct plants several methods of providing support of the crystals undergoing growth have been furnished, notably the provision of a propeller-stirrer, a compressed gas ring agitator, a compressed air ring agitator, and the circulation of the bath liquor from the saturator overflow to a point a few inches above the salt ejector. Some of these methods are immediately applicable to saturator; others demand new plant. High length/breadth ratio is said to be caused by the high ferric iron content of the saturator liquor. To reduce the iron nearly to the ferrous state by the addition of reducing agents to the bath is inconvenient in practice. The addition of oxalic acid to bath liquors having acidities of 2·7 to 7% offers the simplest known method of control. Indications are that sodium oxalate will prove equally effective as, but cheaper than, oxalic acid. Some technicians prefer to eject periodically a certain quantity of sulphate of ammonia solution from the bath to an external tank, and to neutralize this solution with ammonia. Thus, ferric sulphate is converted to ferric hydrate, and the desired conditions established not only for the production of a salt of satisfactory length/breadth ratio, but for one of a better colour.

An improvement of colour can be effected by the regular addition of small quantities of creosote, and the constant removal of the scum. Sulphate of ammonia is now classified into two types, known as Grade I and Grade II. To qualify for Grade I, the salt must conform to:—1. *Size.*—No lumps greater than 4 mm.; not more than 25% to be greater than 2 mm. (8 B.S.S.); not more than 40% to pass through a 30 B.S. sieve; not more than 5% to pass through a 72 B.S. sieve.

2. *Colour.*—There should be no marked individual colour.

A bonus of 3s. per ton for Grade I salt has been allowed on all deliveries made since Oct. 1.

A Paper which aroused interest was the one on " By-Product Ammonia: Development of the Manufacture of Concentrated Gas Liquor in Automatically-Controlled Plants, and its Treatment at Central Chemical Works," given at the Institution Annual Meeting in June last by Mr. P. Parrish. That the Gas Industry is reaping substantial pecuniary advantage from the adoption of automatic gas liquor concentration processes, five of which were described in detail, is evident from the contribution in question, and the subsequent discussion that arose.

At a time of national emergency it is well to recall what Mr. Parrish remarked—that " . . . The automatic processes for the concentration of gas liquor afforded the best known method of conserving ammonia and sulphur in a readily-utilizable form. Apparently nothing quite so promising had hitherto been possible. Gas liquor had been concentrated at two works for some time, containing 18-22 units of ammonia and 8-10 units of sulphur, proportions almost adequate to ensure the direct formation of 50% of the ammonia as ammonium sulphate." If gas liquor of such quality can be manufactured at two works carbonizing coal, why not at others? The sulphur recovered by gas undertakings, either as (*a*) the ammonium sulphide content of concentrated gas liquor, or (*b*) as spent oxide, will be a product of outstanding importance before the present struggle has terminated. Every ounce of ammonia and sulphur should be recovered, and it is not improbable that the appropriate Controller will call for the erection of improvised plant at those works not now recovering ammonia in a utilizable form. The nation's needs must be met, and it is well that this should be done without further delay.

Meantime, there is an increasing demand for ammonium nitrate and muriate of ammonia, galvanizers' quality and dog-tooth crystals, due to circumstances arising out of the war.

Certain gas undertakings are taking advantage of the Public Health (Drainage of Trade Premises) Act, 1937, and are serving a Trade Effluent Notice on the Local Authority. This is a salutary step, and the Liquor Effluents and Ammonia Committee is to be congratulated on the vigilance that it has exercised, and is continuing to exercise, in the interests of the Gas Industry in this regard.

## Tar Products

An examination of the prices ruling for tar products up to the outbreak of war reveals that for the most part these continued to decline; that creosote was as difficult to sell advantageously as in 1938, and that the demand for pitch was peculiarly sluggish, with a consequent decline of price. Indeed, the figures quoted for several months were largely nominal. On the other hand, those tar products coming within the ambit of the British Hydrocarbon Oils Production Act, 1934, such as crude benzole, motor spirit, 90% benzole, toluole, pure toluole, xylene, and naphthas, maintained steady prices up to the end of September, when for reasons affecting the war no further quotations in the usual form were issued. Pure toluole advanced in price from 2s. 3d. per gallon at the early part of the year, to 2s. 6d. in May, and to 2s. 7d. from September to Nov. 22, when it was announced that it was controlled. The Minister made an Order under which he takes control of all toluene, toluole, and other coal tar spirits containing more than 2% of toluene. Low-gravity benzole obtained from gas-works using continuous vertical retorts is included in the Order.

Sixties crude carbolic acid remained steady at prices ranging from 1s. 7d. to 1s. 10d. per gallon from January to the end of November, when a sudden advance, for predictable reasons, to 2s. 10d.-3s. per gallon was reported. Notwithstanding such an abrupt advance, it appears that a lesser quantity of phenol is likely to be required for the manufacture of explosives in the Hitler war than during the Great War, when it will be recalled that large synthetic phenol plants were erected at many factories in this country, and at one of the large London Gas-Works, to meet exigent demands.

Despite the fact that plants for the production of phthalic anhydride by the catalytic oxidation process have been at full work, and that such intermediates as beta naphthol, beta naphthylamine, and various substituted derivatives have been produced at a satisfactory rate, the price for naphthalene pure crystals remained at £13 10s. to £16 for eleven months of the year, and only in December was there a sudden advance to £16-£20 per ton.

It cannot be doubted that in normal times the rate of production of many tar products exceeds the demand. Some

interesting figures, reproduced below, concerning the approximate annual production of by-products in the gas and coking industries in this country were given by Sir Harold Hartley in a Paper to the B.C.G.A. Conference at Brighton in April last. Benzole, 50 mil.gal.; sulphate of ammonia, 350,000 tons; sulphuric acid (from spent oxide), 220,000 tons; tar, over 2 million tons, which yields: road tar, 700,000 tons; pitch, 600,000 tons; creosote, 90 mil.gal.; naphthalene, 30,000 tons; cresylic acid, 20,000 tons; toluene, 5 mil.gal.; xylenes and solvent naphthas, 5 mil.gal.; pyridine bases, 4,000 tons.

What is being done to improve market demands for those products, such as creosote, cresylic acid, naphthalene, and pitch, which have remained sluggish for some two years now? Is the Tar Distillers' Association or other research body studying the problems which have arisen? Has the proposed method of Gill and Jones, by which the dual processes of oil cracking and water gas production are effected, proved a success? Little has been heard of this proposed method of reducing the quantity of redundant pitch, and yet its treatment in an oil gas cracking retort on the lines originally outlined appears to possess elements which are fundamentally sound.

The combustion of pitch for the generation of steam has not been free from difficulty. The continuous pumping of molten pitch presents mechanical problems not yet fully solved. Benzole still remains the bright spot, and contributes satisfactorily to the revenue of most gas undertakings. Patent literature reveals that the avoidance of loss in the refining of crude benzole has been the subject of continued attention. Crude benzole under pressure is refined without the use of chemicals (Brennstoff Chem. 1939, *20*, 65-66). It is estimated that the cost of the plant would be covered by the saving in the consumption of sulphuric acid, and the reduction in refining losses, in twenty months' operation. A crude benzole freed from pyridine by washing successively with dilute sulphuric acid, caustic soda, and water, is heated to 225° C. at 20-25 atm. for four hours (Niggemann's process). The best operating conditions vary slightly with different benzoles. Motor benzole is refined by the Rostin process (*Coal Carbonisation*, 1939, *5*, 37-40), by which crude benzene is vaporized, mixed with water vapour and a carrier gas (producer or water gas), and passed through a catalyst chamber filled with an iron ore heated at 350° C. The refined benzene and water are condensed and separated. The sulphur compounds in the crude material are converted into $H_2S$. The yield of refined benzene is claimed to be higher (by up to 11%) than that obtained by the sulphuric acid washing process.

Experiments by the Fuel Research Board on the desulphurization of benzole by means of mild hydrogenation treatment suggests that the chemists of this country are alive to the need for improving the refining process. Pelleted molybdenum disulphide is the most suitable catalyst, and it is found that the benzole can be satisfactorily desulphurized without causing reduction of catalyst activity, at a temperature of 350° C. and a pressure of 20 atm. The treated benzole yielded 96% by weight and contained a proportion of aromatic and unsaturated hydrocarbons, practically identical with that of the original " once-run " benzole. The value of the benzole for use as a motor spirit was practically unaffected by the refining process, the octane number being reduced only from 105 to 103.

An additional Brassert oven for the production of pitch coke has been erected at Rainham. In Italy, Vetrocoke (B.P. 499,669) provides for the conversion of pitch into coke in coke ovens, with externally-heated chambers, the pitch being mixed with graphite obtained directly from the distillation products by cracking them in high-temperature chambers at 800-1,400° C. Preferably the coke chambers are about 8 in. wide, and the graphite is ground before being mixed with the pitch.

The continuous type of tar distillation plant has continued to operate with success, and new installations are projected. Dr. J. S. Carter has described three methods of arresting pitch fume. The air displaced when the hot pitch is run into the cooler is passed into a concrete pit, over which is built a brick tower 6 ft. by 2 ft. by 2 ft., filled with asbestos board baffles. For removing pyrophoric FeS, the air is led upwards from the cooler into a brick chamber filled with coke. The other type of arrestor consists of three tanks, each sealed with green oil, connected in series with the cooler.

Hodsman's process involving the use of lime for the treatment of road tars (B.P. 471,216) has continued to extend, but little has been heard of the use of polyvinyl compounds in road tars, to which reference was made in last year's review. While there may be a tendency to withhold orders for road tar during the war period, for reasons of economy, it seems certain that this will prove a false step.

Meanwhile, the efforts of the Joint Committee of the Department of Scientific and Industrial Research and the British Road Tar Association, of concentrating on the problems of immediate importance, must gradually bear fruit. In road research, as Mr. Cone has rightly pointed out, the main problem is the substitution of a science of road-making for the empirical methods of trial and error over long periods, on which existing practice is founded.

Only one word more. Toluole is now in urgent demand. Every effort should be made to increase production to the maximum. There is need for imagination and drive. Every pound of ammonia, benzole, sulphur, and toluole will be required if we are to bring the present struggle to a successful issue.

## Stocks and Shares

In this section of our Review it has been the custom to take a retrospective glance at the year's events and report on the most salient political and economic features in so far as they have related to Stock Exchange matters. After four months of war, however, with its attendant restrictions, both national and individual, the happenings prior to the commencement of hostilities now appear in an almost halcyon past and, after the major event, can be of little interest. Suffice it to say that since September, 1938, the whole world had been dominated by European politics, and although from time to time during this period some bursts of activity have appeared on the Stock Exchange, these were always of short duration owing to the dreaded uncertainty of the future.

The year 1939, therefore, has been a disastrous one for dealers in and holders of stocks and shares. Even prior to September the volume of business was much below its normal proportions, while immediately after the outbreak of war business for a short time came to a standstill. Latterly, however, a semblance of activity has returned and values in some directions have made a bold recovery. At one time minimum prices were fixed for British Funds, but these were ultimately exceeded and quotations in this section are now only a few points below those ruling at the beginning of the year. Some of the leading industrial shares have also made rapid improvement, but the securities of those companies whose products are not of an essential nature have suffered severely.

The fall in the value of gas stocks and shares has been extremely heavy, and quotations have been marked down drastically without any regard to the local conditions of the various companies. Undertakings serving evacuated areas are being badly hit both as regards losses in consumption and the very heavy extra expenditure on civil defence. The financial result of these additional burdens was clearly outlined by Sir David Milne-Watson at a meeting in November with Press representatives when he announced an increase of 2½d. per therm in the price of gas on behalf of his own Company and that of the South Metropolitan, Commercial, South Suburban, Tottenham, and Wandsworth Companies. He also indicated that the stockholders of these Companies must be prepared for reduced dividends. The effect on stock prices can be seen in the table below, but a number of provincial

undertakings serving reception areas are doubtless at least maintaining their sales of gas, though the stocks of these companies have been marked down with the same ruthlessness as the rest.

From the commencement of the year to the end of August prices gradually weakened in sympathy with other markets and some heavy losses occurred—e.g., Commercial dropped 30 points, South Metropolitan 27, Tottenham 27, and Wandsworth 29. At the outbreak of war further depreciations took place and on the average the capital loss on ordinary stocks since January is now in the neighbourhood of 30%, while in a few isolated cases it is 40% and over.

The position is illustrated in the following table showing the middle market price of a number of leading ordinary stocks at the close of last year, compared with the price just prior to the war, and the value at the time of writing. It is interesting to note that of the companies in the list the Commercial is the only one to show a small improvement since September.

ORDINARY STOCKS

| | 1938. Dec. 30th. | 1939. Aug. 31st. | 1939. Dec. 8th. |
|---|---|---|---|
| Alliance & Dublin | 135 | 135 | 120 |
| Associated Gas & Water | 18 - | 17/- | 15 6 |
| Bournemouth 7% | 159½ | 148½ | 120 |
| Brighton 5% | 128½ | 117½ | 102½ |
| British | 135½ | 105 | 95 |
| Cardiff | 120½ | 110½ | 100 |
| Commercial | 79½ | 49½ | 53 |
| Croydon sliding scale | 138½ | 123½ | 105 |
| Gas Light units | 22 9 | 18/9 | 16 3 |
| Liverpool | 123 | 112 | 100 |
| Imperial Continental | 113½ | 105 | 77½ |
| Portsmouth & Gosport | 159½ | 137 | 114½ |
| Sheffield | 141 | 134½ | 120½ |
| South Eastern Gas Corpn. | 22 - | 21/- | 16 6 |
| South Metropolitan | 104½ | 77½ | 63½ |
| South Suburban | 115½ | 99½ | 80½ |
| South Western Gas Corpn. | 17/- | 16/- | 15/- |
| Southampton | 107½ | 102½ | 80 |
| Tottenham | 127½ | 100½ | 90 |
| United Kingdom Gas Corpn. | 18/6 | 16/- | 14/6 |
| Wandsworth | 138½ | 109½ | 90½ |
| Watford | 130½ | 109½ | 95 |

Turning to the position of the fixed-interest stocks, it is surprising to note the extent to which these have been marked down. Ranking as they do in some cases prior to several millions of dividend-paying ordinary capital, the yield on current prices of from 5% to 6% is exceptionally high. South Metropolitan 6% preference, with a drop of 31 points, shows the heaviest loss and as will be seen in the list below a number of others are over 20 points down on the year.

PREFERENCE AND DEBENTURE STOCKS

| | 1938. Dec. 30th. | 1939. Aug. 31st. | 1939. Dec. 8th. |
|---|---|---|---|
| Bournemouth 6% pref. | 132½ | 124½ | 115 |
| Commercial 3% deb. | 73½ | 58½ | 57½ |
| ,, 5% deb. | 115½ | 105½ | 90 |
| Croydon 5% deb. | 114½ | 109½ | 95 |
| Gas Light 4% pref. | 99½ | 89½ | 79½ |
| ,, ,, 3% deb | 78½ | 66½ | 70½ |
| Mid Southern 4% pref. | 97½ | 84½ | 75 |
| Severn Valley 4½% cum. pref. | 20 6 | 19/6 | 18/- |
| South-Eastern 4½% red. cum. pref. | 20/- | 19/- | 18/- |
| South Metropolitan 6% pref. | 130½ | 117½ | 99½ |
| ,, ,, 4% pref. | 97½ | 82½ | 75½ |
| ,, ,, 3% deb. | 76½ | 70½ | 65½ |
| South Suburban 5% pref. | 110½ | 103½ | 92 |
| ,, ,, 4% pref. | 97½ | 85½ | 75 |
| ,, ,, 5% deb. | 115½ | 107½ | 95 |
| Tottenham 5½% pref. | 118½ | 110½ | 100 |
| ,, 4% deb. | 97½ | 89½ | 82½ |
| United Kingdom 4½% 1st cum. pref. | 20/- | 18/- | 15/- |
| Wandsworth 4% pref. | 97½ | 84½ | 75½ |
| ,, 5% deb. | 115½ | 105½ | 97 |
| ,, 4% deb. | 97½ | 91½ | 80 |

It was said of the year 1938 that owing to two long periods of unseasonable weather and higher coal costs it had been a trying one for gas administrators. But what of 1939? The tables above show to what extent the market has depreciated the values of gas securities over the year, but not until the accounts for the period are published will it be possible to see how four months of war, and war under very different conditions from those of 1914, have affected profits. Unfortunately reduced dividends will be inevitable in a number of cases, but investors will of course realize that the lower rates are occasioned by circumstances entirely beyond the control of the companies concerned.

## Obituary

While the passing years bring with them new developments in many branches of the Industry, so there occur inevitable gaps in the ranks of those who have helped to make those developments possible. No record of 1939 would be complete without mention of some of the eminent men who—though gone from us—have left their mark on the Industry's progress.

The North of England Gas Managers' Association early in the year lost one of their past-Presidents by the death of Dr. John T. Dunn, who occupied the chair of the Association in the session 1937-38. Dr. Dunn was Public Analyst for a large area of north-east England and was President of the Society of Chemical Industry in 1933-34. For fifty years with the Leeds Gas Department—from 1918 to 1932 as Assistant Manager—Mr. C. H. Mitchell died in January. He is remembered in Leeds as the one on whom it fell to carry on the operations of the Gas Undertaking during the most difficult period of the last war, when the staff was seriously depleted and his Chief was absent on Admiralty work.

By the death of Professor Arthur Smithells in February the Industry lost a staunch supporter and a distinguished representative. At the early age of 25 he was appointed Professor of Chemistry at the Yorkshire College, Leeds, where he developed his own department and began his research work on flame. This work led to his closer association with the Gas Industry, which was strengthened by his election in 1911 to the Presidency of the S.B.G.I. At this time the Industry was ripe for emergence from the empirical to the scientific, and it was due largely to Professor Smithells' encouragement that the Industry decided, as a memorial to Sir George Livesey, to endow a Livesey Professorship of Coal Gas and Fuel Industries at the University of Leeds. Professor Smithells was elected to Honorary Membership of the Institution of Gas Engineers in 1907 and was an active worker on the Joint Research Committee, of which he was the first Chairman in 1910. The Gas Industry is further indebted to Professor Smithells for the report he prepared in conjunction with Sir Dugald Clerk and Professor J. W. Cobb, which showed the high efficiency of gas production and the value of the carbonization process in the national economy of coal.

After 56 years in the service of the gas undertaking at Lincoln, the last 15 of which he was Engineer and Manager, Mr. W. H. Mainwaring passed away in February. He will be remembered also for seven years' work as Secretary and Treasurer of the Eastern Counties Gas Managers' Association, which position he relinquished in 1928.

An association with the Industry of nearly 60 years' standing was ended in April by the passing of Mr. Charles Dru Drury, a Director and former Engineer of the Sunderland Gas Company. He will long be remembered for his services to the Industry in whose activities he took the most lively interest. At the time of his death he was undertaking his second term of office as President of the North of England Gas Managers' Association, having previously occupied that position in 1898-99. His pioneer work at Sunderland stands out as fitting tribute to his memory. During 47 years with that Undertaking the works were largely extended and modernized, and he was responsible for introducing the first installation of Dessau retorts in the country. He was awarded the H. E. Jones Medal for a Paper on this subject which he read to the Institution of Gas Engineers in 1911. In Mr. Dru Drury's death the Industry lost an able administrator, a far-seeing engineer, and a shrewd councillor, while many of its members lost a friend whom it will be hard to replace.

An active member of the Industry in the Channel Islands, Mr. H. Morris, Managing Director of the Jersey Gas Light Company, passed away in April in his 65th year, after 44

years with that Company, thus severing a family connexion with the Undertaking of 75 years. A lifetime's devotion to the Gas Industry and the welfare of his staff was ended by the death of Mr. George Wilks, General Manager and Secretary of the Watford and St. Albans Gas Company. Fifty-seven years of age, Mr. Wilks was within a month of completing his 42nd year of service with the Company, which he joined as a general clerk in June, 1897. From a small undertaking serving only Watford and Bushey, and employing but a few score men, Mr. Wilks saw the Company thrust forward into new spheres of activity in all directions, and himself rose from a clerk's desk to become the chief executive officer of a company employing a thousand men and women. He was a member of the executives of the National Gas Council, the B.C.G.A., the London and Counties Coke Association, and the Federation of Gas Employers.

The Irish Association of Gas Managers lost their President, during his term of office, by the death of Mr. F. G. McElwee, Engineer and Manager of the Coleraine Gas Department. The sudden death of Mr. F. H. James, Deputy Chairman of the Imperial Continental Gas Association, occurred in August.

A wide circle of friends in the Gas Industry learned with regret of the death in October of Mr. S. E. Halliwell, Secretary and Commercial Manager of the Bristol Gas Company since 1917. Before going to Bristol Mr. Halliwell was Manager and Secretary of the Littleborough Gas Company, and during that period he served for ten years as Hon. Secretary of the Commercial Section of the Manchester District Association of Gas Engineers. He was also a founder of the Manchester and District Junior Gas Association and for two years its President. Mr. Halliwell was closely identified with all the Regional and National organizations connected with the Gas Industry, serving on the executives of the British Gas Federation, the National Gas Council, the B.C.G.A., the British Road Tar Association, and on many other committees concerned with the affairs of the Industry. During his term at Bristol the Gas Company made remarkable strides.

Well known to many in the Gas Industry, Professor R. V. Wheeler, Professor of Fuel Technology in the University of Sheffield, passed away towards the close of October. Prominently associated with the Industry for 40 years, Sir Robert Gardiner died in November at the age of 83. His connexion with the Industry began with his appointment as Secretary of the Imperial Continental Gas Association in 1879, which position he occupied until 1894. Subsequently he was on the Boards of a number of gas undertakings, including the Danish Gas Company, the British Gas Light Company, and the European Gas Company.

The contracting side of the Industry has suffered a number of losses during the past year, and here again a life's work is reflected by many developments which have led to greater efficiency in both production and utilization of gas. Among those who have passed on may be mentioned Mr. J. J. Gittings, Governing Director of Gittings & Hills, Ltd., who was connected with the paint trade for almost 60 years. Mr. H. Stonewall Jackson was for many years Manager and later a Director of Spencer-Bonecourt, Ltd. Mr. Frank E. Bird, Australian Manager of West's Gas Improvement Company, Ltd., went to Australia in 1911 to erect the first installation of vertical retorts in Sydney. Dr. J. G. Stewart, as Head of the Sigma Instrument Company, devoted the greater part of his life to the study and production of the laboratory requirements of the Gas Industry. One of the oldest appliance manufacturing concerns in the country lost their Chairman and Managing Director by the death of Mr. Percival William Flavel. Mr. F. C. Tilley was connected with the Gas Industry throughout his business career with Tilley Bros., of Hendon, being Chairman of the S.B.G.I. in 1923-24. He was a member of The Institution of Gas Engineers and was also a Director of Peebles & Co., Ltd., of Edinburgh. Mr. C. E. Crompton was since 1923 Chairman of Cochran & Co., Ltd., of Annan.

A former Chairman of the Council of the S.B.G.I., Mr. H. M. Thornton died at the beginning of June, after a long and active association with the gas cooker and fire business, which entitles him to be ranked among the pioneers of an essential branch of the Industry. He was a Managing Director of Radiation, Ltd., and a number of other appliance manufacturing firms. He was actively concerned in the formation of the S.B.G.I. and was a strong supporter of the B.C.G.A. at its inception and served on the Executive Committee for many years. He was also a member of the Council of the B.G.F., Central Advisory Board, Gas Industry Committee of the British Standards Institution, Advisory Committee on Research of The Institution of Gas Engineers, and the Joint Advisory Committee of the National Gas Council. Mr. V. H. Stott, who died towards the end of July, was Managing Director of James Stott & Co. (Engineers), Ltd., with whom he had been associated for nearly 50 years in the production of gas catering equipment. Sir Paul Makins, who died in September, was Vice-Chairman of Glover & Main, Ltd., and its subsidiary Companies. In the same month Drakes, Ltd., lost a former Chairman and Managing Director by the death of Mr. J. Wilfrid Drake. He took an active share in the work of the S.B.G.I., of which he was Chairman of the Council in 1924. Mr.Drake was also a member of The Institution of Gas Engineers. The death occurred last month of Mr. J. Firth Blakeley, who retired some 15 years ago from an active part in the firm of Firth Blakeley, Sons & Co., Ltd. In earlier years Mr. Blakeley had been with Robert Dempster & Sons, Ltd., and W. C. Holmes & Co., Ltd.

# Personal

Following the death of Mr. Richard Nelson, Engineer and General Manager of the East Hull Gas Company, the Directors have appointed Mr. T. W. T. HAMMERTON, hitherto Secretary, to the dual post of Manager and Secretary, while Mr. BERNARD STONHAM, first Assistant, becomes Engineer.

* * *

The engagement is announced of COLIN TILLEY CORBET WOODALL, second son of Mr. and Mrs. John Corbet Woodall, of Fryleigh, Betchworth, and Pamela, youngest daughter of the late Mr. James D'Arcy Lever and of Mrs. John Moon, of Highfield, Tiverton, Devon.

* * *

Sir GILES GILBERT SCOTT, R.A., has joined the Board of Directors of the Building Centre and has become Chairman in the place of the late Maurice Webb. Others who have also joined the Board are Sir Alfred Hurst, K.B.E., C.B., Mr. Oswald P. Milne, F.R.I.B.A., Mr. Thomas S. Tait, F.R.I.B.A., and Mr. D. L. Bridgwater, A.R.I.B.A.

* * *

The staff and employees of the Newcastle-upon-Tyne and Gateshead Gas Company met on December 21 to offer their congratulations to Mr. T. P. RIDLEY, General Manager and Secretary of the Company, on the completion of his 50th year of service.

At the Directors' meeting held earlier in the week the Chairman of the Company, Sir Cecil Cochrane, expressed the pleasure felt by the Directors in being able to mark this happy occasion, and he referred in the highest terms to the great value of Mr. Ridley's services to the Company during the past half-century. As a memento of the anniversary the Directors presented Mr. Ridley with a silver tray, and at the meeting of the employees Mr. Ridley was asked to accept a silver tea service of a similar design. The decorative design on the silver consists of a reproduction of the handsome illuminating work which adorned the writing of the Books of the Holy Gospel, the work of the monks on the island of Lindisfarne, or Holy Island.

The congratulations of all were expressed by various speakers. Particular reference was made to his active share in the introduction of various schemes for the benefit of the Company's servants. Mr. Ridley, in acknowledgment, referred to the loyal co-operation of all those engaged with him in the Company, and his satisfaction that the benefits of co-partnership, pensions for retiring servants, sick benefit society, and the like, all of which he had seen introduced, were now available and appreciated by all.

# Obituary

The death occurred at his residence, East Fergus Place, on Dec. 21, of Mr. JAMES KINCAID, late Gas Engineer to the Kirkcaldy Corporation.

Mr. Kincaid, who was a native of Dumbarton, commenced his professional career in that town under the late Mr. James Gilchrist, a well-known consultant Gas Engineer of that time. In August, 1893, he was appointed Manager of the Peterhead Gas-Works, and during his stay there executed numerous improvements that brought his name quickly to the forefront of the Scottish Gas Industry. In December, 1898, Mr. Kincaid was appointed to a similar post at Falkirk, and carried out much good work in the re-designing of the gas-works there. He received the appointment as Gas Manager to the old Kirkcaldy Gas Company in 1903. Mr. Kincaid up to his retirement in 1937, had thus completed 34 years' service to the Kirkcaldy gas undertaking, which was taken over by the town in 1911. Since that time, the output of gas in the Burgh has increased from 150 million to close on 300 million cu.ft. per annum, this being largely due to Mr. Kincaid's abilities. Many works improvements were carried out in his time, including the building of the new vertical retort house, the new purifying plant, and the new waterless gasholder.

# The Institution of Gas Engineers

On Dec. 13, elections to membership of The Institution of Gas Engineers were made, under the provisions of its Royal Charter and By-Laws and Education Regulations, in accordance with the following Ballot List:

### To Membership (7)

Allbutt, Victor Oliver, Engineer, Saltley Works, Birmingham Gas Department.
Atkins, Edward Wulstan, M.A., Distribution Engineer, Bath Gas Company.
Calvert, Norman, M.Sc., Senior Chemist, Nottingham Gas Department.
Chadder, William James, Design, Development and Technical Sales Engineer, Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd.
Mann, Harold Cornwallis, Chief Engineer and Manager, Chemical Engineering and Wilton's Patent Furnace Co., Ltd.
Rosin, Paul Otto, Dr. Ing., Dipl. Ing., Consulting Fuel Technologist.
Spinks, William Lawrence Spero, Fittings Superintendent, Birmingham Gas Department.

### To Associate Membership (28)

Bennett, Patrick Valon, Technical Assistant, Rochester, Chatham, and Gillingham Gas Company.
Brewer, Frederick John, Technical Assistant and Engineering Draughtsman, Parkinson and Cowan (Gas Meters), Ltd.
Cazalet, Francis Mott, B.A.Sc., Representative, Industrial Gas Sales Department, British Columbia Electric Railway Co., Ltd., Vancouver.
Charles, Edward Francis, Technical Assistant, Oswestry Gaslight and Coke Company, Ltd.
Croft, Charles Ronald Murton, B.A., Assistant Engineer, Wandsworth and District Gas Company.
Davison, Douglas William, B.Sc., Chief Technical Assistant, Aberdeen Gas Department.
Dickson, Albert Edward, Works Superintendent, Sheffield and District Gas Company.
Downs, Frederick Stephen, Assistant Engineer, Bishop's Stortford, Epping, and District Gas Company.
Harrison, Alfred, Deputy Engineer, Accrington District Gas and Water Board.
Harvey, Frank, Deputy Engineer and Manager, Bilston Gas Light and Coke Company, Ltd.
Hearsey, Edwin, Engineering Assistant, Brighton, Hove, and Worthing Gas Company.
Hindle, Charles, Technical Assistant, Nelson Gas Department.
Holgate, Henry William, Draughtsman, Distribution Department, Gas Light and Coke Company.
Houston, William Tresham, Technical Assistant, Wandsworth and District Gas Company.
Howe, William Leslie, Industrial Sales Engineer, Nottingham Gas Department.
Johnson, William Harold, Junior Technical Assistant, Mid-Southern Utility Company.
Jordan, Ronald Ernest, Assistant Engineer and Designer-Draughtsman, Woodall-Duckham Vertical Retort and Oven Construction Co. (1920), Ltd.
McDougall, Thomas, Engineer and Manager, Linlithgow Gas Company, Ltd.
Madge, Gordon Henry Winzer, Mains Superintendent, Gas Light and Coke Company.
Mayo, Arthur Francis, Industrial Representative, Gas Light and Coke Company.
Medhurst, William Edwin, Assistant to Distributing Engineer, South Suburban Gas Company.
Mulholland, John, Chief Chemist, East Hull Gas Company.
Parkyns, Alfred Douglas, Assistant Works Manager, Exeter Gaslight and Coke Company.
Pedler, Thomas Wakeham, Chemist, Exeter Gaslight and Coke Company.
Pegg, Ernest Edward, Special Representative, Gas Light and Coke Company.
Robinson, Arnold, Production Engineer, Halifax Gas Department.
Stewart, Eric Ritchie, Chief Assistant Engineer, Romford Gas Company.
Ware, William James Kirkby, B.Sc., Assistant Engineer, Gas Light and Coke Company.

### To Associateship (7)

Blane, Donald Fraser, Chief Clerk, British Gas Light Company, Ltd., Bletchley.
Gibbons, Stanley James, Special Representative, Gas Light and Coke Company.
Layton, Walter Hinks, Special Representative, Gas Light and Coke Company.
Oake, Raymond, District Representative, South Suburban Gas Company.
Pearson, Charles, Staff Officer, Gas Light and Coke Company.
Roberts, Frank, Special Representative, Bradford Gas Department.
Ronca, James Gordon, Special Representative, Gas Light and Coke Company.

# News of the Week

**The Amalgamation** of the gas and electricity undertakings into a light and power department is under consideration by the Lytham St. Annes Corporation.

**The Gas Engineering Department** at the Westminster Technical Institute resumes its classes on Monday, Jan. 8. The full complement of teachers is re-appointed, and any students who desire to complete their Gas Engineering (Supply or Manufacture) Courses or to begin new ones will be welcome. Full details of the syllabus are contained in the prospectus for the session 1939-40.

**With the Sanctioning** of low-intensity street lighting, Bolton will be one of the first towns in the country to have the system in operation. Recent tests with screened gas lighting have paved the way to a system of this kind, and the lamps will need little alteration to conform with the Government regulations. A central control for the lights is installed.

**As a New Departure** in the Plymouth and Stonehouse Gas Light and Coke Company's home service, Miss K. Jenkin is in attendance at the showrooms every Tuesday afternoon and every Wednesday morning for the purpose of discussing with consumers any household or cookery problem which they may bring to her. She is also available for the same service at consumers' own homes by appointment.

**The Question of Erecting Benzole Plant** at the Aylestone Road Gas-Works was discussed by the Leicester Gas Committee at their meeting on Dec. 11. After careful consideration, however, it was decided that nothing should be done until approaches had been made to the Government to see if they would subsidize the scheme in any way or make a grant towards the cost involved in laying down the plant.

**The Medical Charities Fund,** organized by employees of the Newcastle-upon-Tyne and Gateshead Gas Company, has reached over £1,288 as a result of contributions during the past year. This sum has been distributed among a large number of Northumberland and Durham hospitals and charities.

**A.C.E. Machinery, Ltd.,** which became a public company in 1938, reports a profit of £30,271 for the year ended Sept. 30. Income tax and N.D.C. took £19,009, and a final dividend of 12½% is recommended, making 20% for the year. The carry-forward is £3,162, against £38.

**Government Consent** to build a new holder at Gosforth is being sought by the Newcastle-upon-Tyne and Gateshead Gas Company. It is not intended, however, to proceed with the work until after the war. The Gas Company propose acquiring 4½ acres of land for the purpose. Residents in the locality have decided to organize a petition against the plan on the grounds that it will spoil the amenities of the district and cause a depreciation in residential property.

**A Model Gas-Works** constructed by members of the sixth form was one of the features of a fascinating exhibition devoted to science and hobbies at the Speech Day celebrations of Leys School, Cambridge. The model was actually producing gas, and the "Story of Coal" was further amplified by other models, photographs, diagrams, &c., including extraction of tar and benzole, production of fertilizers, the operation of a gas meter, the evolution of the incandescent burner, and the demonstration of many articles in everyday use derived from by-products. The Cambridge University and Town Gas Light Company assisted by supplying a number of exhibits and further co-operated by showing gas films.

## Institution of Gas Engineers

### 1940 Examinations

Owing to the delay in opening technical schools in the present session, the annual examinations of the Institution of Gas Engineers in Ordinary, Higher, and Diploma Grade Gas Engineering (Manufacture) will be held on June 8, 1940, and the corresponding examinations in Gas Engineering (Supply) on June 15, 1940.

Applications from external candidates for entry in the 1940 Examinations should be made to the Secretary of the Institution of Gas Engineers, 1, Grosvenor Place, S.W.1, not later than April 6 next, while applications from internal candidates should be made to the Principals of their respective technical colleges in the usual way.

## Fuel Rationing to be Suspended

### Mines Department Announcement

Rationing of coal, coke, gas, and electricity is to be suspended for the present, but the Government are still retaining the existing machinery, though in skeleton form. Economy in the use of fuel by the public has made possible the suspension of rationing, but it is emphasized that the need for this economy still exists.

The new decision will enable staffs of the rationing organization to be very much reduced—in some cases by as much as 75%. This applies particularly to the local fuel overseers. Areas will be enlarged, the new basis being a sub-division of regional areas. There will thus be a considerable saving in administrative costs.

The following is the official announcement as issued by the Mines Department:

"Since the ration for coal, gas, and electricity was raised to 100% of last year's consumption, it has been found that substantial economy is being practised by the public; and the Government have decided, therefore, that in present conditions it is not necessary for the statutory restriction to be retained.

"The Government are relying on the public continuing to exercise the utmost economy, and it is of great importance that they should do so. In case there should be any appreciable fall in coal stocks or any other situation should arise which necessitates the reintroduction of rationing, either nationally or regionally, machinery for rationing must be ready to be put into operation at very short notice. For this reason it is necessary to retain the rule that consumers of coal may purchase only from the merchants with whom they are registered."

## Further Price Increases

In addition to the increases in the price of gas by various undertakings, referred to already in these columns, the undermentioned advances have also been announced:

*Alyth.*—From 5s. 5d. to 6s. 3d. per 1,000 cu.ft. as from Jan. 1.

*Appleby.*—A 7½d. per 1,000 cu.ft. increase, dating from New Year's Day.

*Bridgnorth.*—By 1d. per therm.

*Burton-on-Trent.*—By 2d. per therm to domestic consumers and by 1d. per therm for bulk supplies.

*Chester.*—By 1d. per therm to 9d.

*Dewsbury.*—By 10d. per 1,000 cu.ft., with increased rateable value and 2s. 1d. (instead of 1s. 8d.) on the two-part tariff.

*Droitwich.*—By 6d. per 1,000 cu.ft.

*Dundee.*—By 8d. per 1,000 cu.ft.

*Duns.*—By 5d. per 1,000 cu.ft. to 6s. 3d. per thousand.

*Ellesmere.*—By 1d. per therm.

*Goole.*—By 6d. per 1,000 cu.ft.

*Great Grimsby.*—To 8.8d. per therm, representing an increase of just under 7½%.

*Huddersfield.*—By 6d. per 1,000 cu.ft.

*Morpeth.*—By 5d. per 1,000 cu.ft.

*Newport (Salop).*—By 1d. per therm.

*Plymouth and Stonehouse.*—By 1½d. per therm, or 5⅝d. per 1,000 cu.ft.

*Rhyl.*—A 9d. per 1,000 cu.ft. increase to take effect from Jan. 1.

*Rugby.*—By 0.6d. per therm.

*Shipley.*—To 1s. 2½d. per therm, with relative increases to prepayment consumers and on the two-part tariff.

*Skipton.*—By 3d. per 1,000 cu.ft.

*Spenborough.*—By 2d. per therm.

*Stratford-on-Avon.*—By 2d. per 1,000 cu.ft.

*Torpoint.*—From 7s. 1d. to 7s. 6d. per 1,000 cu.ft.; rebate to prepayment consumers to be discontinued.

*Watford.*—By ¼d. per therm.

*Wellingborough.*—By 3d. per 1,000 cu.ft., or 0.65d. per therm.

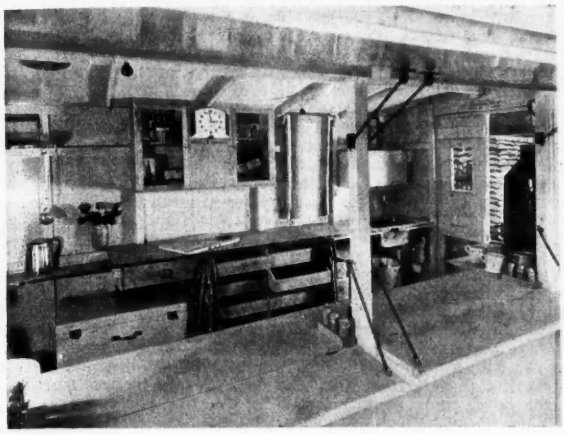
*Wombwell.*—By 4d. per 1,000 cu.ft.

# A GIFT TO THE FORCES

## W.G.C. Plan

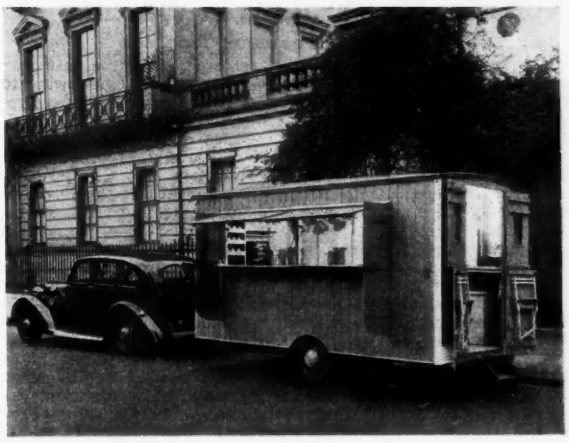
THE Women's Gas Council are anxious to present a gift to the Forces, and if sufficient funds are forthcoming this will take the form of a mobile canteen. Lady Milne-Watson (Vice-President of the Women's Gas Council and President of the Southend Branch) has kindly consented to act as Hon. Treasurer of the Fund.

The plan has been welcomed enthusiastically by the Branches. The appeal is taking different forms in different districts to suit local conditions. In some branches the Secretaries are asking for



a collection of threepences, pointing out to members that 15,000 threepences will buy a mobile canteen. In other towns whist drives, Christmas parties, and entertainments are being arranged, the proceeds to be given to the fund.

Mobile canteens do valuable work. Under present conditions, more so than formerly, there are small numbers of men working in isolated groups, both in this country and abroad. To these



men a mobile canteen can bring hot soup and tea, hot pies and patties, baked potatoes, and other small comforts.

A trailer canteen has been planned for the Women's Voluntary Services in which the limited space has been used to the best advantage, and the Women's Gas Council hope that their canteen will be fitted up on similar lines, with additions suitable to the conditions under which the canteen will be working. For example, supplies of little personal necessities, pocket combs, razor blades, might be carried round. Facilities for taking laundry to the wash and back and for posting letters would be appreciated by the men. A small library, say one shelf of books, would also be popular.

In the mobile canteens already on the road food is carried in zinc-lined trays. Interchangeable trays are kept at the depot so that the canteen can be loaded in a few minutes. The food is screened from dust by washable curtains. A tea urn built on the thermos system will keep tea hot for five hours after it has been poured off the leaves. There is a container to keep food hot for several hours. A water tank of four to six gallons capacity is fitted over a small sink. Elastic wires keep the fittings in place while the canteen is moving.

Each unit is fitted up to the last detail, not only with a supply of such things as mugs and plates, but with such small necessities as a pair of scissors, salt and pepper pots, mops and dusters. Such a unit is illustrated in the accompanying photographs.

## Scrap Campaign Result

Last week saw the end of the first phase of the scrap iron and steel canvass begun by the Iron and Steel Control some two months ago. It is estimated that about 80,000 tons of scrap metal have been recovered from the fringes of industry. A great deal of this might never have been collected save for the stimulus of the appeal. A mailed reminder of the national need for scrap was dispatched to gas companies, municipal undertakings, gas fittings, meter and stove manufacturers and other industrialists all over Britain, and the appeal was supplemented by an article in the "JOURNAL" of Nov. 1, which showed in detail how the Gas Industry could help the steelworks in this respect. Beginning in London, the whole country was covered by districts and about 150,000 manufacturers were approached. The movement was supplementary to the ordinary business of the organized scrap industry, though holders of scrap were encouraged to get rid of their material through the normal trade channels.

In arriving at the tonnage figure, answers to a simple questionnaire were carefully analysed and the total was reached by summating the clearances which could be directly attributed to the appeal. It is believed that in addition a good deal of material was salvaged, which never appeared in the returns. Though 80,000 tons is barely equal to the normal tonnage handled by the scrap merchants each week, it represents an extremely valuable addition to British raw material resources. In effect, it frees about a dozen full cargoes of shipping for other essential imports. The Iron and Steel Control expects the stimulus of the campaign to persist and plans to make systematic contact with other supply sources. This week the farmers in Gloucestershire were approached, and the results of this test survey will provide the basis for schemes to reach all sections of the agricultural community.

## Prompt Publicity at Newcastle

### "Good News for Gas Users"

A praiseworthy example of up-to-the-minute publicity comes to us from Newcastle-upon-Tyne. On the very day that fuel rationing was suspended a striking advertisement appeared in the local Press under the caption "Good News for Gas Users," while this was followed up by a Christmas card from the Gas Company to thousands of their consumers on the same theme—"You may now use gas without restriction as in peace-time."

In conjunction with the announcement of these cheerful Christmas tidings, the Company are offering for a limited period special concessions for early orders of gas fires—namely, hire or hire-purchase terms carry three months suspension of charges, with a 12½% discount on cash transactions.

## Athletic and Social

### George Wilson Gas Meters Supper and Dance

It is not without interest in these troublous times to record that the social activities of many undertakings in the Gas Industry are not being allowed to fall into abeyance. An example is to be found in the recent supper and dance enjoyed by the works A.R.P. personnel of George Wilson Gas Meters, Ltd. It proved to be one of the happiest social events the works have yet had, and during the course of the evening Mr. W. Towman, A.R.P. instructor, paid tribute to the willingness and efficiency of the various squads, to which Mr. Wilson replied that this was in no small measure due to the keenness and ability of the instructor.

# Meter Diaphragms in Wartime

## Overcoming Previous Troubles

Not least among the advances achieved since the last war are those in connexion with meter diaphragms which owing to the war time changes in composition of gas in 1914-18 were responsible for a part of the unaccounted-for gas in those days. Replying to the discussion on his paper on "Unaccounted-for Gas" at the general meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers. Mr. C. B. Felton expressed the hope that the advance of knowledge in this direction will help to avoid any recurrence of the troubles of the last war-time period.

Confirmation of that hope was afforded by the letter from Mr. G. Jessup Cutbush, Local Director of the Metropolitan Leather Co., Ltd., which appeared in the "JOURNAL" of Nov. 29 (p. 441) wherein he pointed out that not only have vast stocks of best Persian skins been accumulated, but intensive research in the intervening years has been directed to every aspect of the diaphragm problem, including differences in tannage, suitability of different types of sheepskins (including those of home grown sheep) selection of breed, chemical resistance and calibration.

Even if the war lasts long enough to produce a shortage of the leathers which have been proved by long experience to be the best for the purpose, there will be excellent substitutes to take their place.

From Mr. Cutbush a "JOURNAL" representative learned recently that the Metropolitan Leather Co., which supplies diaphragms to meter manufacturers in many parts of the country and abroad, has carried out research on every aspect of leather treatment, and has made a special study of chemical resistance. The effects of most of the known destructive chemicals have been examined with a view of maintaining a supply of leathers that will stand up to the purposes for which they are intended.

Most of the skins used in the United States for gas meter diaphragms are obtained from home grown sheep as also are many of those used in New Zealand. A considerable amount of research has been carried out to ascertain the performance of such leathers in English meters and a number of domestic skins are actually in use in experimental meters in different parts of the world and in this country. Results so far have emphasized that extreme care is needed in the selection of the skins and the particular portion of the skin chosen for the diaphram; without this care disappointing results are inevitable. Furthermore modifications have been found necessary in the tanning technique and the oil dressings to be used.

An interesting sidelight was thrown on modern methods of tackling leather problems when our representative learned that the laboratory is by no means confined to problems connected with ordinary meter leathers, but all kinds of queries are dealt with concerning the performance of diaphragms for other types of apparatus. For instance, the Company was recently called upon to provide leathers suitable for small gas governors to be installed in the base of gas fires. The temperature in which the governors were to function was considerably higher than that which leather, subject to the ordinary treatment, can be expected to withstand.

The gas fire manufacturers and the leather company got together as a result of which they met more or less half-way and the temperature at which point the governors were to be fixed was reduced, and the tannage and oil dressing of the leather adjusted to meet the special needs of the job. It is, indeed, the practice of the company to get to know the problem of the manufacturers and then to work out the solution. Some diaphragms have delicate work which necessitates soft, thin skins, and these are obtained from specially selected very young lambskins.

Some idea of the variety of the work handled can be gathered from the fact that diaphragms supplied range from 1¼ in. to 6 ft. in diameter (the latter from whole hides), while fabricated leathers as large as 8 ft. 9 in. have been supplied. Some of the leathers have to be capable of withstanding pressures up to 30-40 lb. per sq.in. The Gas Industry is fortunate in having manufacturers who are prepared to go to such lengths of specialization in order to produce for them diaphragms really adapted to their requirements, and it would appear that the industry need have no fears that a repetition of its diaphragm troubles during the last war will be repeated in the present upheaval.

# Forthcoming Engagements

**1940.**

**Jan.**

**9.—N.G.C.**—Central Executive Board, 11 a.m.

**27.—Yorkshire Junior Gas Association.**—Meeting at Leeds. Presidential Address of T. G. Lewis.

**31.—Gonjoint Conference of Public Utility Associations.**—Eighth Annual General Meeting, Gas Industry House, 3 p.m.

# The Tale of the Rates

## An Interesting Analysis of Municipal Affairs

Mr. W. Allison Davies' 55th annual statement of rates levied by local authorities throughout the country reaches us at a time when not a little interest is centred upon the probable repercussions of the war upon municipal finances. While the full effect of emergency expenditure is clearly not fully reflected by the figures in the analysis, this "tale of the rates" discloses the general trend of municipal affairs.

In addition to setting out the scale of rates levied in 353 municipal areas, in conjunction with the figures of the previous year, the tables also include interesting details of the appropriation of the rates by the various services, together with totals of populations, rateable values per head of population, and particulars relating to gas, water, and electricity supplies in each area. The figures of rates imposed must not necessarily be taken as the actual burden on the ratepayer in direct comparison with the corresponding figure in another town; for, where the figure in the pound may be high, the rateable values may be low, and *vice versa*. The figures do, nevertheless, when set against those of the previous year, indicate the general tendency.

On the latter basis the statistics reveal that of the 353 authorities included in the analysis only 11 can show a reduction in rates, while 65 remain unchanged. The remaining 277 show increases varying from 1d. to as much as 3s. in the pound. Of the eleven which show improvement, one—namely, Wakefield—follows upon another reduction last year.

To deal separately with the four categories into which the analysis is divided, of the 28 Metropolitan Boroughs included in the return 20 show increases, seven remain the same, while one only—Southwark—shows a small improvement. Bethnal Green and Poplar share the highest figure of 18s. in the pound, while Westminster still maintains the lowest figure at 10s. 6d., though in the latter case the rate has increased by 3d. compared with the previous year.

Of the 84 County Boroughs 21 remain the same, while five can show a decreased rate, the average advance being from 13s. 11½d. to 14s. 5½d. in the pound. Bournemouth still has the lowest figure at 7s. 10d. in the pound, and Merthyr Tydfil the highest at 30s. 6d. —the latter being an increase of 3s. over the previous year. Of the 163 Boroughs included in the analysis, 22 show no change and four a reduction, bringing the average up from 12s. 10⅞d. to 13s. 5½d. In this category Hove still has the lowest figure of 8s. in the pound, and Jarrow the highest at 22s. Of the 78 Urban Districts, 15 have no change, and one only shows a reduction, resulting in an average increase from 14s. 7¾d. to 15s. 5⅝d. Walton and Weybridge at 9s. 2d. in the pound and Abertillery at 27s. 6d. indicate the lowest and highest figures in this group. It will be noted throughout the analysis that those municipalities operating in what have come to be known as the depressed areas continue to show the highest figures in the pound.

Among particulars of domestic services, the return gives the prices of gas per therm and per thousand cu.ft. within and without the districts concerned, together with the declared calorific value of the gas supplied. Other details of interest are the estimated transfers from municipal undertakings to the relief of the rates and, conversely, the estimated transfers to undertakings in respect of deficiencies. Only four of the latter, so far as gas undertakings are concerned, are recorded—namely, Dewsbury, Leeds, Ellesmere Port, and Swadlincote—making an aggregate charge upon the rates of £11,408, while 15 municipal gas undertakings contribute a total of almost £86,000 (estimated) towards the relief of the rates—the Nottingham Gas Department again being the most generous in this respect with its usual quota of £31,500. In this connexion, however, it should be pointed out that the return is not intended to demonstrate the desirability or otherwise of municipal trading or of diverting the profits therefrom to the relief of the rates. Indeed, it is safe to assume that the large majority of municipal gas undertakings whose figures are not specifically mentioned in the analysis are directing their profits to the benefit of the undertaking itself and of its service to the consumer.

# Cannon Iron Foundries, Ltd.

The Report of the Directors of Cannon Iron Foundries, Ltd., to be presented at the Fifth Ordinary General Meeting of the Company on Dec. 29 shows that the net profit for the year after charging all expenses (including depreciation and Directors' fees), certain A.R.P. expenditure, and reserve against British Government Securities is £10,652 19s. 8d., to which must be added £7,942 10s. 10d. from the last account, making a total of £18,595 10s. 6d. From this amount fall to be deducted the dividends already paid or provided for on the preference shares as per the profit and loss appropriation account amounting to £7,356 5s., and income tax and National Defence Contribution, £5,702 16s. 8d., leaving available £5,536 8s. 10d. The Directors recommend that the dividends already paid be confirmed, and that the above amount be carried forward to next account.

# Furnace Design

## Extract from the 30th Report of the Refractory Materials Joint Committee

By L. R. BARRETT, B.A., B.Sc., M.S.,
and
A. T. GREEN, F.I.C., F.Inst.P.

Institution Communication No. 218

(Continued from page 631)

Few manufacturers of insulating firebrick in this country are ready to recommend their products for use in contact with the furnace gases, but look upon them as backing-up bricks for higher heat duty than diatomite blocks. However, the properties of British bricks appear to be similar to those made in the United States, where hot-face insulation can be said to be out of the experimental stage. Designers and users of furnaces wishing to replace dense firebrick by porous firebrick are hampered by certain disadvantages in the latter. The chief of these is the ease with which flying slag particles and molten slag penetrate and dissolve the open clay structure of the bricks. A coating which reduces the penetrability and which can be renewed without renewing the bricks is some help. It is likely that liability to slag attack will always limit their use so long as clay is the base.

The lightness which makes porous insulating firebricks suitable for roofs, doors, and walls, carried with it a low strength to crushing and vibration and is one essential reason why the spalling resistance is, in general, poor. Another reason is to be found in the low heat conductivity. In raising the temperature of a furnace, steeper temperature gradients are set up than in the more highly conducting ordinary firebrick. In use, the insertion of the cold charge abstracts heat from the walls. Unless the heat input is increased to counteract this, the insulating firebrick lining will suffer heat shock, more or less severe, depending on the rate at which the cold charge can absorb heat from the walls.

It has been noticed at Sheffield that spalling more often occurs in installations which are carried up to 1,200° C. (2,200° F.) than only to, say, 900° C. (1,650° F.). This can be accounted for by the fact that air-blast burners are commonly used in the former types, while inspirated air burners are used in the latter. Sometimes, to reach working heat quickly, air-blast burners are used solely for heating up and give place to atmospheric burners to maintain the temperature.

No attempt is made to treat insulating firebricks carefully in heating up, as though they were silica, and it would be considered retrograde to do so. Rather should research be prosecuted to find the correct physical properties to reduce the liability to spalling. For hearths, where the goods are not supported on skid rails, insulating firebricks are unsuitable. There has been some disappointment with arches constructed of these bricks, though as far back as 1932 sprung arches were in use in the United States, with spans up to 15 ft. 6 in., according to M. J. Terman.[26] At operating temperatures of 1,450°-1,510° C. (2,650°-2,750° F.) the spans were limited to 12-13 ft. In 1933, Allen [14] used insulating firebrick crowns to round down-draught brick kilns with a diameter of 20-30 ft. and working up to 1,300° C. (2,370° F.).

A method of construction which avoids the thrust at the skew-backs and crown supports is the suspended roof,[27] which takes full advantage of the lightness and heat resistivity of insulating firebricks and allows for expansion in a more positive way. For small spans where there is not much difference in the rise between an arch and a suspended roof, the former is to be preferred on account of cost. Powdered insulation should not be spread over the hanging tiles, since the heat carried away by the steel members, which will now be hotter, will more than compensate for the blanketing effect of the powder. An interesting advance in heat-treatment furnace design employs a suspended roof and walls, separated by an air gap from a thin insulating covering. Combustion air is blown through the space, cooling the refractories and becoming itself warmed. Recuperators may be interposed to heat the air further.[28] Other factors which need to be taken into account in designing furnaces are the possible reduction in refractoriness of insulating firebricks in a reducing atmosphere and the observed shrinkage which sometimes takes place over long periods of time well below the recommended safe upper limit of temperature. This is a matter which has been referred to in American literature.[8] [29] The abolition of dense, high-heat-capacity bricks from the working space throws the onus of ensuring temperature uniformity on a proper circulation of furnace gases.

The method of calculating the proper thickness of insulation of each kind is too familiar to need repeating.[30] A good account of the calculation of the most economical thickness of insulation is that by N. A. Humphrey.[31] When the conditions deviate from the ideal of a plane wall in thermal equilibrium, calculation is more difficult. By the use of a shape factor,[32] [33] corners and edges of a small furnace may be allowed for, but there is still divergence between calculation and experiment. Excrescences such as burners, buck stays and brackets act as additional radiating fins. R. Hadfield and R. J. Sarjant[34] [35] have shown that it is possible to predict by calculations, with reasonable precision, the rate of rise of temperature of a furnace wall, and the heat losses at any time. Experimental determinations are necessary to supply correction factors.

*Permeability and the Use of Coatings.*—The passage of gases through the walls of a furnace contributes to the heat loss. To prevent this, for all but the largest installations where the cost is prohibitive, it is best to encase the furnace in steel plates and press powdered insulation into the space immediately behind. This practice also offers the advantage of a cushion between the steel plates or angles and the brittle insulating firebrick. When the hot face is of insulating firebricks, the majority recommend a refractory cement wash about $\frac{1}{16}$ in. in thickness. This serves a multiple purpose. Gases cannot penetrate into the bricks so easily, flame erosion and mechanical abrasion are reduced, and heat is reflected back into the furnace. Small pieces are largely prevented from falling off the insulating firebrick lining. This is especially necessary in vitreous enamelling furnaces. Allen [14] recommends a wash of white glaze enamel having a fusion point about equal to the maximum firing temperature of the kiln or oven, or a wash or refractory cement. Several applications should be made at intervals. Leun[8] finds an air-setting, low-shrinking, high-temperature cement suitable. Most of those available in the United States, he finds, shrink too much. This coating absorbs the flying particles of iron in a reheating furnace. When the coating is destroyed it can be renewed.

*The Reflecting Power of Furnace Linings.*—Both Allen[14] and Leun[8] believe that the semi-fused white coating reflects heat back into the furnace. When the contents of the furnace are at nearly the same temperature as the walls, black body conditions prevail and the emissivity of the walls can have but a very slight effect on heat conservation. However, in many industrial applications, such as in reheating or forge furnaces, the charge is at a considerably lower temperature than the walls for much of the time. Under such conditions heat will be reflected back on to the hearth. However, heat from the roof and sides behind the white coating will be reflected back to the same extent, so that the value of the coating as a radiant heat reflector is problematical. The emissivity of refractory materials for radiant heat at operating temperatures is usually considered to be between 0·8 and unity. Data obtained by R. H. Heilman[36] [37] show that

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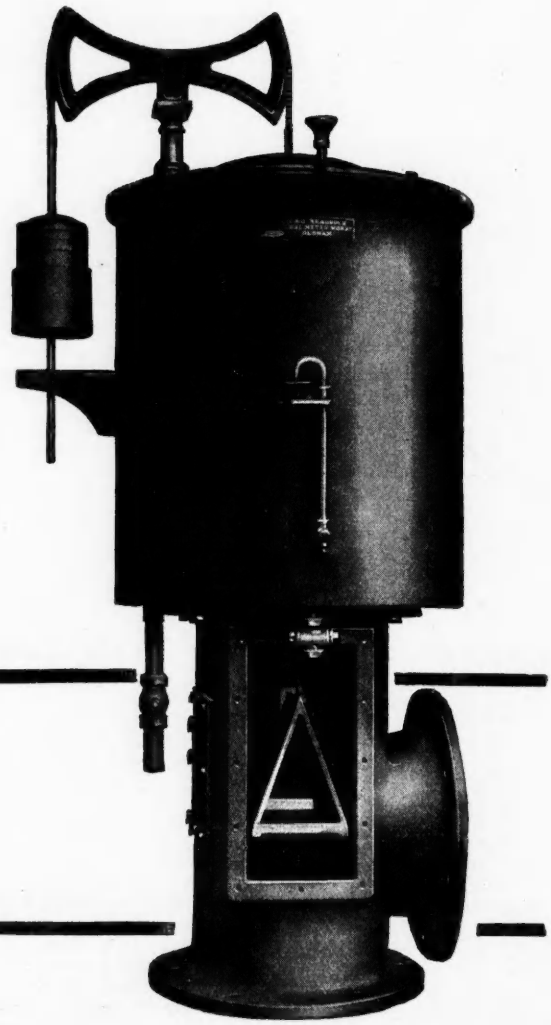

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the emissivity of white and light-coloured materials falls from values of about 0·9 at 93° C. (200° F.) to 0·3 at 1,090° C. (2,000° F.), whilst black refractories preserve a fairly constant value between 0·9 and unity between the same temperature limits. Heilman recommends that muffles be of black material, as well as the silica brickwork in steel-melting equipment, unless luminous flames are used, when essentially black-body conditions prevail. To slow up the rate of heating of a cold charge the walls of a heating furnace should be light coloured. Then, when the temperature difference between walls and charge is greatest, the radiant heat transfer is impeded.

*Highly Conducting Refractories*

There are certain positions in most high-temperature installations where gas-tight partitions are required which impede the flow of heat as little as possible. The walls of muffles and recuperator tubes are examples. Further, a refractory of high conductivity and non-spalling properties is required in water-cooled parts.

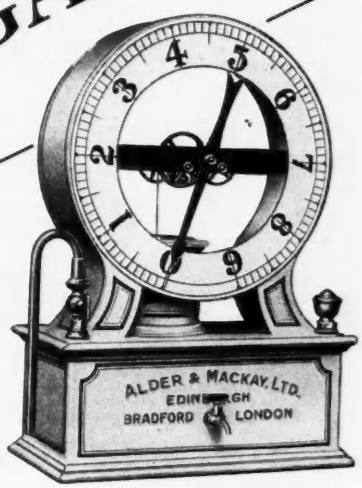
Another use requiring complete freedom from warping and shrinkage at high temperatures, coupled with high strength, is in tunnel-kiln car furniture. For such purposes re-crystallized silicon carbide has almost all the necessary properties. It is of low porosity and permeability to gases, hot and cold, it has a small coefficient of thermal expansion and a high thermal conductivity, and also great compressive and tensile strength at high and low temperatures. Further, it cannot be melted, but volatilizes at the highest temperatures of use. However, troubles have been encountered in its use. Thus, a furnace for firing a lead-oxide-containing enamel in an oxidizing atmosphere was constructed partly of silicon carbide. After operating for a time at 930°-1,200° C. (1,700°-2,200° F.) the silicon carbide had disintegrated to such an extent that it could be shovelled out of the furnace.[38]

When lighting up a muffle tunnel kiln operating at 1,500° C. (2,730° F.), F. H. Riddle and A. B. Peck[39] took the opportunity of setting in the muffle chambers (made of silicon carbide tiles cemented with clay-silicon carbide mortar) cylinders of various bodies, including silicon carbide mixes suitable for saggars for use at 1,500° C. (2,730° F.). The mixes contained clay in some cases. The temperatures of exposure ranged from the lowest temperatures up to greater than 1,446° C. (2,640° F.). After eighteen months of continuous running, the silicon carbide tiles were in good condition with tight joints, perhaps due to the tiles expanding and closing the gap, but more probably due to the expansion of the mortar, which was now composed of a large amount of granular cristobalite with unchanged silicon carbide, mullite, and some glass. In marked contrast to the stability of the silicon carbide built into the structure (in which a commercial brand was used), the cylinders were much affected. At 600°-1,000° C. (1,110°-1,830° F.) the cylinders had swollen to twice their size because the silicon carbide had become oxidized to cristobalite, which occupied more space; they were also cracked and iron-stained.

It is generally found[40 41] that expansion due to oxidation begins at 800° C. (1,470° F.), is most noticeable at 1,000° C. (1,830° F.), and ceases to be important above 1,200° C. (2,200° F.). A user stated that silicon carbide gave the best service at about 1,300°-1,350° C. (2,370°-2,460° F.) with continuous running.

It has been noticed that the tiles used in the muffle chambers of pottery tunnel ovens made of silicon carbide are variable in their durability. After several years' running one tile may be extremely weak whilst an adjacent tile may be glass hard. There is a possibility that the sorting of silicon carbide by the manufacturers may account for this. One furnace builder recommends that silicon carbide should be replaced by sillimanite in muffles for pottery tunnel ovens if a change is made from producer gas to town gas firing. Presumably this is based on the supposition that town gas will not contain the constituents which will form a protective glaze on the tiles. L. W. Briggs[42] thought that oil-firing seemed to glaze silicon carbide bricks, whereas (natural) gas firing did not, perhaps because combustion took place more in the furnace in the former case. M. F. Beecher,[40] of the Norton Company, says a viscous coating forms at temperatures in excess of 1,200° C. (2,200° F.), which retards the oxidation. It is common practice to apply a glaze or relatively impervious coating to articles. One


King's PRESSURE GAUGES




Illustrated is the Circle Gauge for 9" readings which is a particularly sensitive instrument. The brass spindle is located on roller bearings and the black figures are 1¼" high on a 14" diam. white enamelled dial. The filling plug and gas connection are interchangeable.

*Further particulars of other gauges and prices will be sent on application.*

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successful type is a magnesium aluminous silicate, whilst another is essentially a porcelain body. These coatings are fired on at 1,400° C. (2,550° F.) to a porcelain-like mass. Perfect protection, according to Beecher, is only obtainable between 800° and 1,200° C. (1,470° F. and 2,200° F.) when the coating is perfect, which is impracticable.

On account of the drawbacks to the use of silicon carbide, the next best material from the point of view of thermal conductivity, namely, fused alumina, has found some favour. Its thermal conductivity is lower than that of silicon carbide products, but is still about three times that of firebrick. It is very refractory and resists abrasion, but its resistance to spalling is reputed to be not so good as that of silicon carbide. Thus Beecher[40] gives the figures set out in Table 2.

TABLE 2.—*Properties of Special Refractories*

| | Softening Point, ° C. | Load Test, per cent (*b*) | Resistance to Spalling (*c*) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Fused alumina ... ... | 1,835 | 2·0 | 3 |
| Silicon carbide ... ... | (*a*) | 0·1 | 10 |
| Mullite ... ... ... | 1,800 | 1·1 | 3 |

(*a*) Does not melt, but dissociates at 2,250° C.
(*b*) At 1,500° C. with 50 lb. per sq. in.
(*c*) Heated to 1,350° C. and cooled in air blast equals one cycle.

The method of manufacture of the products has a considerable influence on the spalling tendency.

A type of furnace which is coming to the fore at the present day is the radiant tube furnace. Gas is burnt in tubes placed usually in the bottom and top of the furnace chamber. The radiation surface for a given furnace volume can be greater than is possible with a muffle. This method of heating enables the combustion of the gas to be adjusted to give the maximum efficiency irrespective of the furnace atmosphere required. The heating is only by radiation, so that insulation of the hot face can be more extensive than is considered advisable by furnace makers when the open-flame type of furnace is under consideration. So far no general use has been made of refractory tubes in these furnaces. Up to temperatures approaching 1,100° C. (2,000° F.) radiant tubes of heat-resisting metal are used in vitreous enamelling, decorating, and annealing furnaces. It would be highly desirable to operate at temperatures in excess of those to which it is at present limited. For this purpose refractory tubes or channels would be necessary, preferably of a high conductivity. The high speed of the combustion gases reduces the resistance to heat transfer on the gas side to a low value. The lower the conductivity of the tube the greater must its heating area be for a given gas consumption.

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(*To be continued.*)

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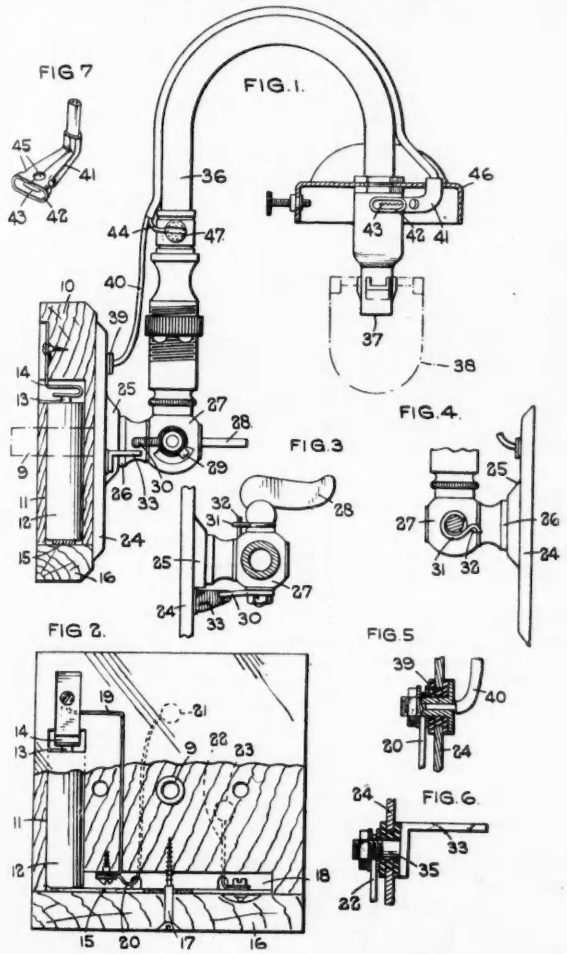
# New Self-Lighting Gas Burner

In the "JOURNAL" some time ago we announced the patenting by the Cannock District Gas Company and one of the Company's fitters of a self lighting gas burner. The patent specification has been published (No. 511.203; application date, Feb. 18, 1938 —Cannock District Gas Company and D. H. Mizen).




The invention relates to incandescent gas lighting units of the kind wherein the fitting is provided with a manually operable valve, an electric igniter and an electric switch associated with the valve. The arrangement is such that the valve is turned beyond the fully open position to close the switch, and thus energize the igniter, after which the valve is automatically returned to the fully open position and the switch opened by means of a spring.

The gas lighting fitting is made as a self-contained unit. A battery for energizing the igniter is housed within a wall, ceiling or like attachment through which the gas pipe passes, the combined gas valve and igniter switch being located externally of the attachment.

Fig. 1 is a part-sectional side elevation of a lighting unit constructed in accordance with the invention and for application to a wall or other vertical surface. Fig. 2 is a rear face view partly in section, of the mounting block. Fig. 3 is a part-sectional plan view showing a combined gas cock and igniter switch. Fig. 4 is a part-sectional side elevator of the back of the cock shown in Fig. 1. Figs. 5 and 6 are fragmentary sectional views, showing details of construction, while Fig. 7 is a perspective view of the igniter.

The unit comprises a mounting block 10 which may be made of wood or any other suitable material. This block is hollowed out as shown at 11, so as to provide a housing for a battery 12. For engaging one pole 13 of the battery, a spring contact 14 is provided within the block 10, at the lower part of which is arranged a plate contact 15 for engaging the other pole of the battery.

The side portion 16 of the block 10 is made removable from the main part of the latter, so that an exhausted battery can be taken out and a new one inserted. As illustrated, the part 16 is retained in position by a screw 17, but it may have one or more projecting dowels or tongues which can be pushed into one or more recesses in the main part 10, so that the removable part will retain its position by friction. Alternatively, the part 16 may be hinged to the part 10 and a releasable fastening may be provided for retaining it in the closed position.

The lower part of the block 10 is further recessed as shown at 18, and an electric conductor 19 connects the plate contact 14 to another electric lead 20, this electric lead being taken up through a groove in the block and through an opening 21.

Further, the contact plate 14 has connected to it a lead 22 which is taken up through a hole or groove in the block to an opening 23.

On the front of the block is a pressed metal rose 24, having a boss 25 through which extends the gas pipe 9. This gas pipe is screwed into a gas feed pipe located in the wall, and the rose 24 may be retained in position by engagement of its outer face with the shoulder 26 of a gas cock, indicated generally at 27, to which the pipe 9 is connected. The gas cock may be of the plug type and is provided with an operating member 28, and on the end of the plug is situated the usual stop washer 29. Further, on this end of the plug is fixed a contact arm 30 forming one element of an electric switch.

At the opposite end of the plug is a spring arm 31 adapted to co-operate with a stop pin 32.

The contact arm 30 co-operates with a stationary arm 33 fixed upon, but insulated from, the rose 24, and the electric lead 22 is brought to a pin 35 (see Fig. 6) which serves to conduct the current to the arm 33.

The arrangement is such that, with the finger piece 28 in the position shown, the plug valve is fully open. The finger piece 28 can, however, be turned to make the arm 30 engage the contact arm 33 so as to close the switch. In doing this, the spring arm 31 is stressed so that, when the finger piece 28 is released, the spring arm 31 returns the cock to the open position shown in Fig. 1, in which position the switch formed by the parts 30 and 33 is also open.

Fixed to the cock 27 is an incandescent burner tube 36 of known form, this tube terminating in a discharge orifice indicated at 37 under which is secured a mantle 38.

The lead 20 is taken to a hollow pin 39 (see Fig. 5) which is fixed in, but insulated from, the rose 24, and attached to the hollow pin 39 is a further electric conductor 40. This conductor extends around the burner pipe 36 and is connected to the igniter 41.

The igniter 41 consists of a tubular metal body containing near its open end 42 a piece of resistance material 43, the ends of which are connected, within the body 41, to the conductors 40 and 44 respectively. These two conductors may be enclosed in a single casing as shown.

Within the body 41 of the igniter, sockets or terminals are provided for making the electric connexions between the ends of the conductors 40 and 44 and the ends of the conductors which lead to the resistance member 43, the electrically alive parts being, of course, insulated from the metal body 41 which latter is provided with openings 45 so that the gas can enter it freely. The igniter is mounted in an opening in the usual gallery plate 46 on the burner.

The conductor 44 is connected to the burner tube by a binding screw 47 so that the burner tube 36 forms part of the circuit.

# Results at Sowerby Bridge

The total quantity of gas sent out by the Sowerby Bridge Urban District Council Gas Department during the twelve months ended March 31 last, was 225,047,000 cu.ft., an increase over the output of the preceding year of 3,308,000 cu.ft. or 1.49%. The most noticeable feature of the analysis of gas consumption is the reduction in unaccounted-for gas from 6.2% to 4.7%. The total number of consumers increased from 8,005 to 8,043. The average net price obtained for the whole of the gas sold was 5.48d. per therm or 2s. 0.67d. per 1,000 cu.ft. Residuals returned about 1s. more per ton of coal carbonized than they did in the previous year, though tar was down considerably. The installation of a coke grading and storage plant, with consequent production of a clean, graded, hopper-loaded coke, considerably improved the local market, with the result that, for the first time in many years, the demand was greater than the supply available, and 260 tons of coke were purchased to satisfy local markets. An excellent price was obtained for crude benzole throughout the year, and benzole has proved to be a valuable by-product. The whole production of ammoniacal liquor was given to the Yorkshire Tar Distillers, being taken from the works at no cost to the Department. After a contribution to capital expenditure, there remains a net profit of £80 on the year's working.

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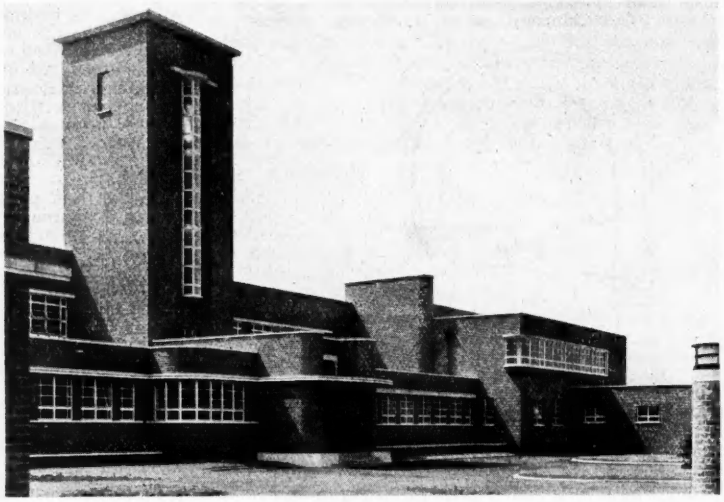
Mr. W. T. Curtis, F.R.I.B.A., County Architect,
Mr. H. W. Burchett, F.R.I.B.A., Assistant Architect for Educational Buildings.



*THE installation of the Gas Fired Plant comprises a Lagged Set for Thermal Storage action with a capacity of 150 gallons, fully insulated and finished in enamel for cleanliness, the Heaters being Potterton Twin "Empire" Series with an output of 60,000 B.Th.U. per hour, thus yielding a maximum power of 200,000 B.Th.U. for peak demand.*

*Illustrated Brochure upon request.*

## Equipped with Potterton's Gas Water Heaters

## THOMAS POTTERTON (Heating Engineers) Ltd.

20-30, BUCKHOLD ROAD, WANDSWORTH, S.W.18.

Telephone: Putney 2263-4-5.
Telegrams: Potterton, Put, London.

SAWER & PURVES

# METERS

HAVE BEEN GIVING

# NATIONAL SERVICE

SINCE 1869

MEMBERS OF THE INSTITUTE OF BRITISH GAS ENGINEERS 1905

NELSON METER WORKS
MANCHESTER 10
TELE COLlyhurst 2289
SAWER MANCHESTER

also at

Radford Meter Works,
NOTTINGHAM
Telephone: 75202

Derby Road,
WATFORD
Telephone: 2645

# Current Sales of Gas Products

### The London Market

Dec. 22.

Prices of tar products in the London market remain as indicated on Dec. 18, namely :

Pitch about 32s. 6d. per ton f.o.b.

Creosote about 5d. per gallon.

Refined tar 3¾d. to 4d.

Toluole is now controlled by the Ministry of Supply Order No. 1, which fixes the maximum price at which this material may be sold.

Pure benzole about 1s. 10d.

95/160 solvent naphtha about 1s. 11d.

90/160 pyridine 14s. to 14s. 6d.

All per gallon naked.

Refined naphthalene crystals about £16 per ton in bags.

All *ex* makers' works.

### The Provinces

Dec. 18.

Crude Gas-Works Tar, 17s. 6d. to 22s. 6d.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were : Pitch—East Coast, 32s. 6d. to 35s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 32s. 6d. to 35s.* Toluole, naked, North, 1s. 9½d. (Controlled by the Ministry of Supply Order No. 1, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 8½d. to 9d. Solvent naphtha, naked, North, 1s. 7d. to 1s. 8d. Heavy naphtha, North, 1s. 3½d. to 1s. 4½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4½d. to 4¾d.; low gravity, 4½d. to 4¾d. Carbolic acid, 60's. 2s. 9d. to 3s. Naphthalene, £15 to £20. Salts, 75s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil : Unfiltered anthracene oil, (min. gr. 1,080), 5½d. to 5¾d.; filtered heavy oil (min. gr. 1,080), 5¾d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

### Scotland

GLASGOW, Dec. 23.

A moderate volume of business has been placed during the week and prices are substantially unchanged.

**Crude gas-works tar.**—Actual value remains at round 30s. to 32s. per ton *ex* works in bulk.

**Pitch.**—Plentiful supplies of vertical quality are still available with prices at 23s. to 24s. per ton f.o.b. for export, and round 20s. to 22s. 6d. per ton *ex* works in bulk for home trade.

**Refined tar.**—Business is difficult but prices remain unchanged at 3¾d. to 4d. per gallon in the home market and 2¾d. per gallon for export, filled into buyers' packages at makers' works.

**Creosote oil.**—Quite a steady demand exists in the home market and quotations are firm as follows : Specification oil, 5d. to 5¼d. per gallon ; low gravity, 5¾d. to 6d. per gallon ; neutral oil, 5½d. to 5¾d. per gallon ; all *ex* works in bulk.

**Cresylic acid.**—Most consumers are fairly well covered on contracts, but prices are well held as under : Pale, 97/99%, 2s. 2d. to 2s. 4d. per gallon ; dark, 97/99%, 1s. 10d. to 2s. per gallon ; pale, 99/100%, 2s. 6d. to 2s. 9d. per gallon ; all *ex* works in buyers' packages.

**Crude naphtha.**—Available supplies command 6d. to 6½d. per gallon *ex* works in bulk, according to quality.

**Solvent naphtha.**—90/160 grade is 1s. 7¼d. to 1s. 8¼d. per gallon and 90/190 heavy naphtha is 1s. 3¼d. to 1s. 4¼d. per gallon.

**Motor benzole** is 1s. 6d. to 1s. 7d. per gallon.

**Pyridine.**—Prices are nominal at 14s. to 15s. per gallon for 90/160 grade and 16s. to 17s. per gallon for 90/140 grade.

## Contracts Advertised

**Station Meter.**
Middlesbrough Gas Department. [p. 698.]

**Mainlaying.**
Middlesbrough Gas Department. [p. 698.]

**Stoves.**
Stockport Gas Department. [p. 698.]

## Diaries, Calendars, &c., Received

Seasonable gifts in the form of diaries, calendars, &c., have been received from the undermentioned friends, whose good wishes are cordially reciprocated :

Staveley Coal & Iron Co., Ltd., nr. Chesterfield.
The Gas Meter Co., Ltd., Kingsland Road, E.2.
J. Stone & Co., Ltd., Deptford, S.E.14.
G. A. Harvey & Co. (London), Ltd., S.E.7.
Head, Wrightson, & Co., Ltd., Thornaby-on-Tees.
Wood, Rozelaar, & Wilkes, Ltd., North Acton Road, N.W.10.
William Guppy & Son, Ltd., Eldon Street, E.C.2.
Standard Furnace & Setting Co., Ltd., Southport.
John G. Stein & Co., Ltd., Bonnybridge, Scotland.

A.R.P.
PROTECTION OF SANDBAGS.

METRO CREOSOTE EMULSION

METRO COPPER CREOSOTE EMULSION

Both Emulsions conform to the Specification of the Ministry of Home Security Memorandum A.R.P. 279/1939 — 20/10/39, and are available in GREEN at slight additional cost.

SOUTH METROPOLITAN GAS CO.

REGIS HOUSE,
KING WILLIAM STREET,
E.C.4.

Telephone : AVENUE 2755.

# *For every size of Works and every class of coal . . .*

# WEST'S CARBONIZING PLANTS

Decisions taken in many cases to go ahead with schemes for gasworks modernization, plant renewals and extensions confirm the progressive wartime policy adopted by the Industry.

Specially important now in the choice of plant are such factors as responsiveness to unusual conditions . . . flexibility . . . . ease of operation . . . long working life . . . all well-known characteristics of the Glover-West carbonizing system ★ *Work is proceeding on a substantial number of current contracts, and we are in a position to give the best possible attention to all enquiries.*

- **GLOVER - WEST VERTICAL RETORTS**
- **WESTVERTICAL CARBONIZING CHAMBERS**
- **RETORT HOUSE EQUIPMENT**
- **COAL AND COKE HANDLING PLANTS**

**440 carbonizing plants built or under construction in 24 countries**

WEST'S GAS IMPROVEMENT CO · LTD · MILES PLATTING · MANCHESTER 10
TELEPHONE—COLLYHURST 2961-2-3-4-5 · TELEGRAMS—STOKER · MANCHESTER
LONDON OFFICE TEMPORARY ADDRESS——BATH ROAD · HARMONDSWORTH
WEST DRAYTON · MIDDLESEX · TELEPHONE — WEST DRAYTON 2288-9

# GAS STOCKS AND SHARES

Markets closed for the holiday on a note of confidence in most sections and recent improvements in prices were well maintained. A feature was the strong support for gilt-edged stocks and further upward movements were recorded, War Loan finishing at 93 and Consols at 68. This return to favour of British Funds is a satisfactory omen and if, as prophesied, further improvements occur in these stocks assistance will be rendered to the Treasury when making its next appeal to investors. Home rails still remain somewhat reactionary in the absence of the Government's announcement on compensation terms and much speculation is in evidence as to the dividend statements which will be made next February. Leading industrials held their higher levels and oil shares continued firm, but rubbers were idle.

The volume of business in the Gas Market showed no signs of any marked increase, which is not surprising having regard to the heavy depreciation which has occurred. It is usual for this market to respond in some measure to any improvement or otherwise in other high-class investment stocks, but the upward movement in the latter has not so far been reflected in gas stocks and shares. At current prices the yields obtainable on most of the fixed-interest variety appear very attractive.

Apart from the usual ex interest markings at this time of the year, the only change of note in the Official List was a drop of 5 points in Imperial Continental to 70, while Gas Light units closed 3d. lower at 15s. 6d. Nominal quotations in the Supplementary List other than those ex interest closed unchanged, while in the absence of Official Lists owing to late mails prices at the Provincial Exchanges must remain as for the previous week.

## Official Quotations on the London Stock Exchange

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Dec. 22 | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 1,767,439 | Sept. 4 | 8 | 8 | Alliance & Dublin Ord. ... | 115—125 | ... |
| 374,000 | June 19 | 4 | 4 | Do. 4 p.c. Deb. ... | 75—85 | ... |
| 877,576 | Nov. 6 | 5 | 5 | Asscd. Gas & Water U'd'ts Ord. | 14/6—16/6 | ... |
| 500,000 | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 17/—19/– | ... |
| 535,545 | ,, | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 16/—18/– | ... |
| 318,730 | ,, | 4 | 4 | Do. 4 p.c. Irred. Cum. Pref. | 15/—17/– | ... |
| 75,000 | Sept. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 80—85 | ... |
| 563,570 | Aug. 21 | 7 | 7 | Barnet Ord. 7 p.c. ... ... | 110—120 | ... |
| 300,000 | Oct. 9 | 1/9⅜ | 1/4⅜ | Bombay, Ltd. ... ... ... | 19/6—20/6 | ... |
| 181,185 | Aug. 21 | 9½ | 9½ | Bournemouth Sliding Scale ... | 135—145 | ... |
| 690,526 | ,, | 7 | 7 | Do. 7 p.c. max. ... | 115—125 | ... |
| 493,960 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... | 112—117 | –½ |
| 50,000 | Dec. 18 | 3 | 3 | Do. 3 p.c. Deb. ... | 68—73* | –2 |
| 362,025 | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 90—95* | –3 |
| 335,000 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 102—107* | –3 |
| 357,900 | Aug. 21 | 7½ | 7½ | Brighton, &c., 6 p.c. Con. ... | 105—110 | ... |
| 669,955 | ,, | 6¾ | 6¾ | Do. 5 p.c. Con. ... | 100—105 | ... |
| 205,500 | ,, | 6 | 6 | Do. 6 p.c. 'B' Pref. ... | 95—105 | ... |
| 855,000 | Sept. 18 | 8 | 7 | British Ord. ... ... ... | 90—100 | ... |
| 100,000 | Dec. 18 | 7 | 7 | Do. 7 p.c. Pref. ... ... | 118—123* | –4½ |
| 350,000 | ,, | 5½ | 5½ | Do. 5½ p.c. 'B' Cum. Pref. | 108—113* | –2 |
| 120,000 | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 73—78* | –2 |
| 450,000 | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 98—103* | –2 |
| 100,000 | 22 May '33 | 6 | 4 | Cape Town, Ltd. ... ... | ¼—⅜ | ... |
| 100,000 | 6 Nov. '33 | 4½ | 4½ | Do. 4½ p.c. Pref. ... | ⅛—¼ | ... |
| 150,000 | Dec. 18 | 4½ | 4½ | Do. 4½ p.c. Deb. ... ... | 55—65* | –3 |
| 626,860 | July 17 | 6 | 6 | Cardiff Con. Ord. ... | 95—105 | ... |
| 237,860 | Dec. 18 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 95—100* | –2 |
| 98,936 | Oct. 9 | 2/– | 2/– | Colombo Ord. ... ... ... | 1 7/16—1 9/16 | ... |
| 24,510 | ,, | 1/4⅜ | 1/4⅜ | Do. 7 p.c. Pref. ... ... | 20/6—22/6 | ... |
| 739,453 | Sept. 27 | –/11.48 | –/11.48 | Colonial Gas Assn. Ltd. Ord. ... | 15/—17/– | ... |
| 296,144 | ,, | 1/3.30 | 1/3.30 | Do. 8 p.c. Pref. ... ... | 20/6—22/6 | ... |
| 1,775,005 | July 31 | 4 | 4 | Commercial Ord. ... ... | 48—58 | ... |
| 140,000 | Aug. 21 | 4 | 4 | Do. 4 p.c. Red. Pref. ... | 88—93 | ... |
| 620,000 | Dec. 11 | 3 | 3 | Do. 3 p.c. Deb. ... ... | 55—60 | ... |
| 286,344 | Aug. 21 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 85—95 | ... |
| 200,000 | ,, | 3¾ | 3¾ | Do. 3¾ p.c. Red. Deb. ... | 94— 99 | ... |
| 807,560 | July 31 | 7 | 7 | Croydon sliding scale ... ... | 100—110 | ... |
| 644,590 | ,, | 5 | 5 | Do. max. div. ... ... | 80—85 | ... |
| 600,000 | June 19 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 90—100 | ... |
| 207,660 | Aug. 21 | 5 | 5 | Dudley, Brierley Hill & Dist. Ord. | 100—105 | ... |
| 82,275 | ,, | 5 | 5 | Do. 5 p.c. Con. Pref. ... | 92—102 | ... |
| 79,000 | ,, | 3¾ | 3¾ | Do. 3¾ p.c. Red. Deb. ... | 94—99 | ... |
| 239,000 | July 31 | 5 | 5 | East Hull Ord. 5 p.c. ... ... | 86—91 | ... |
| 187,215 | Aug. 21 | 6 | 5¾ | East Surrey Ord. 5 p.c. ... | 98—103 | ... |
| 176,211 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... | 90—100* | ... |
| 250,000 | Nov. 13 | 8 | 4 | Gas Consolidation Ord. 'B' ... | 14/—17/– | ... |
| 250,000 | ,, | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 16/—18/– | ... |
| 9,172,463 | July 31 | 5⅞ | 5⅞ | Gas Light & Coke Ord. ... | 15/—16/–a | –/3 |
| 2,600,000 | ,, | 3½ | 3½ | Do. 3½ p.c. max. ... ... | 58—63 | ... |
| 4,477,106 | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. ... | 77—82 | ... |
| 2,993,000 | July 3 | 3¾ | 3¾ | Do. 3¾ p.c. Red. Pref. ... | 80—90 | +2½ |
| 8,602,497 | Nov. 27 | 3 | 3 | Do. 3 p.c. Con. Deb. ... | 68—73 | ... |
| 3,642,770 | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 100—105 | ... |
| 3,500,000 | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Deb. ... | 98—103 | ... |
| 700,000 | Sept. 4 | 3¾ | 3¾ | Do. 3½ p.c. Red. Ded. ... | 85—90 | ... |
| 270,466 | July 31 | 6 | 6 | Harrogate New Cons. ... ... | 95—100 | ... |
| 157,500 | Mar. 20 | ‡1/– | ‡1/– | Hong Kong and China Ord. ... | ⅛—¼ | ... |
| 5,600,000 | Oct. 23 | 12 | 4 | Imperial Continental Cap. ... | 65—75 | –5 |
| 172,810 | July 31 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 81—86 | ... |
| 63,480 | Dec. 18 | 3 | 3 | Maidstone 3 p.c. Deb. ... ... | 55—60* | –2 |
| 45,000 | | †10 | †8 | Malta & Mediterranean ... | 92—102 | –1½ |
| | | | | Metropolitan (of Melbourne) ... | | |
| 392,000 | Oct. 2 | 5½ | 5½ | 5½ p.c. Red. Deb. ... ... | 95—100 | ... |
| 231,977 | Aug. 21 | 5 | 5 | M.S. Utility 'C' Cons. ... ... | 75—80 | ... |
| 968,658 | ,, | 4 | 4 | Do. 4 p.c. Cons. Pref. ... | 70—80 | ... |
| 390,076 | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. ... | 75—85* | ... |
| 148,955 | Dec. 18 | 5 | 5 | M.S. Utility 5 p.c. Deb. ... | 90—100* | ... |
| 125,000 | July 3 | 3½ | 3½ | Do. 3½ p.c. Red. Bds. ... | 92—95 | ... |
| 675,000 | Nov. 6 | †3 | †4 | Montevideo, Ltd. ... ... | 50—60 | ... |
| 250,000 | Aug. 21 | 7½ | 7½ | North Middlesex 6 p.c. Con. ... | 105—115 | ... |
| 396,160 | July 31 | 5 | 5 | Northampton 5 p.c. max. ... | 88—93 | ... |
| 300,000 | Nov. 6 | †7 | 9 | Oriental, Ltd. ... ... ... | 118—128 | ... |
| 468,537 | Dec. 11 | 8 | 7 | Plymouth & Stonehouse 5 p.c. | 98—103 | ... |
| 621,667 | July 31 | 8½ | 8½ | Portsmouth & Gosport Cons. | 12—117 | ... |
| 241,446 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 80—90 | ... |
| 73,350 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 80—90 | ... |
| 75,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 70—80 | ... |
| 114,000 | July 31 | 5 | 5 | Preston 5 p.c. Pref. ... ... | 90—100 | ... |
| 247,966 | Dec. 18 | 4 | 4 | Primitiva 4 p.c. Cons. Deb. ... | 93—98* | –2 |
| 625,959 | July 17 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 93—98 | ... |
| 15,000 | Sept. 4 | 6 | 6 | San Paulo 6 p.c. Cum. Pref. ... | 7½—8½ | ... |
| 441,275 | Oct. 9 | 1/1½ | 1/1½ | Severn Val. Gas Cor. Ld. Ord. | 16/—19/– | ... |
| 460,810 | Oct. 2 | –/10⅝ | –/10⅝ | ,, ,, 4½ p.c. Cum. Pref. ... | 17/—19/– | ... |
| 133,201 | Aug. 21 | 5 | 8½ | Shrewsbury 5 p.c. Ord. ... | 107—117 | ... |
| 9,000 | June 5 | ‡4 | ‡4 | South African Ord. ... ... | 4—5 | ... |
| 1,996,297 | Aug. 21 | 1/2⅛ | 1/2⅛ | South East'n Gas Cn. Ld. Ord. | 15/6—17/6 | ... |
| 1,000,000 | ,, | –/10⅝ | –/10⅝ | Do. 4½ p.c. Red. Cum. Pref. | 17/—19/– | ... |
| 769,191 | ,, | 4 | 4 | Do. 4 p.c. Cum. Pref. ... | 14/6—16/6 | ... |
| 150,000 | ,, | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—95 | ... |
| 6,709,895 | July 31 | 6 | 5 | South Met. Ord. ... ... | 61—66 | ... |
| 1,135,812 | ,, | 6 | 6 | Do. 6 p.c. Irred. Pref. ... | 97—102 | ... |
| 850,000 | ,, | 4 | 4 | Do. 4 p.c. Irred. Pref. ... | 73—78 | ... |
| 1,895,445 | June 19 | 3 | 3 | Do. 3 p.c. Deb. ... ... | 63—68 | ... |
| 1,000,000 | July 17 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 97—102 | ... |
| 600,000 | ,, | 3¾ | 3¾ | Do. 3¾ p.c. Red. Deb. ... | 92—97 | ... |
| 1,543,795 | July 31 | 6 | 6 | South Suburban Ord. 5 p.c. ... | 77—82 | –1 |
| 512,925 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 90—95 | +½ |
| 500,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 75—80 | +2½ |
| 250,000 | ,, | 3¾ | 3¾ | Do. 3¾ p.c. Red. Pref. ... | 85—90 | ... |
| 888,587 | Dec. 11 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 93—98 | ... |
| 250,000 | ,, | 4 | 4 | Do. 4 p.c. Deb. ... ... | 77—82 | –1 |
| 200,000 | July 31 | 3 | 3½ | Do. 3½ p.c. Red. Deb. ... | 85—90 | ... |
| 427,859 | Sept. 18 | 1/2⅛ | 9⅛ | S. Western Gas & Water Ord. | 13/—15/– | –1/– |
| 160,523 | Oct. 9 | –/10⅛ | –/10⅛ | Do. 4½ p.c. Red. Cum. Pref. | 17/6—19/6 | ... |
| 110,000 | Dec. 18 | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 90—95 | –2 |
| 750,541 | July 31 | 5½ | 5 | Southampton Ord. 5 p.c. ... | 75—85 | ... |
| 148,836 | June 5 | 4 | 4 | Do. 4 p.c. Deb. | 75—85 | ... |
| 350,000 | July 31 | 5½ | 5½ | Swansea 5½ p.c. Red. Pref. ... | 90—100 | ... |
| 200,000 | Dec. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—100* | ... |
| 1,076,490 | July 31 | 6¾ | 6¾ | Tottenham and District Ord.... | 85—95 | ... |
| 409,835 | ,, | 5½ | 5 5/8 | Do. 5½ p.c. Pref. ... ... | 95—105 | ... |
| 62,235 | ,, | 5 | 4 | Do. 5 p.c. Pref. ... ... | 85—95 | ... |
| 453,380 | Dec. 11 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 78—83 | ... |
| 1,247,505 | Oct. 23 | 6 | | U. Kingdom Gas Cor. Ord. ... | 13/—16/– | ... |
| 1,085,952 | Nov. 20 | 4½ | 4½ | Do. 4½ p.c. 1st Cum. Pref. ... | 14/—16/– | ... |
| 772,709 | ,, | 4 | 4 | Do. 4 p.c. 1st Red. Cum. Pf. | 14/6—16/6 | ... |
| 745,263 | Dec. 18 | 4½ | 4½ | Do. 4½ p.c. 2nd Non-Cum. Pf. | 12/6—14/6* | ... |
| 1,093,656 | Sept 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 85—90 | –2½ |
| 378,106 | Mar. 6 | 7 | 7 | Uxbridge, &c., 5 p.c. ... ... | 90—100 | ... |
| 133,010 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 95—105 | ... |
| 1,371,138 | July 31 | 7 | 6½ | Wandsworth Consolidated ... | 88—93 | ... |
| 2,525,768 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 73—78 | ... |
| 1,343,964 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 90—100* | –2 |
| 383,745 | ,, | 4 | 4 | Do. 4 p.c. Deb. ... ... | 75—80* | –2½ |
| 400,000 | ,, | 3¾ | 3¾ | Do. 3¾ p.c. Red. Deb. ... | 90—95* | –2 |
| 558,342 | July 31 | 6¼ | 6¼ | Watford and St. Albans Ord. ... | 90—100 | ... |
| 200,000 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 85—95 | ... |
| 200,000 | ,, | 5½ | 5½ | Do. 5½ p.c. Pref. ... ... | 90—100 | ... |
| 200,000 | ,, | 4 | 4 | Do. 4 p.c. Rd. Pf. (1973/8) | 85—90 | ... |
| 100,000 | ,, | — | 33/4§ | Do. 4 p.c. Red. Pf. (1959) | 95—100 | ... |
| 200,000 | Dec. 11 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 83—88 | ... |

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

**Supplementary List and Provincial Exchanges overleaf.**

# STOCK AND SHARE LIST—Contd.

## Supplementary List, not Officially Quoted, London

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Nominal Quotations Dec. 22. | Rise or Fall on Week. |
|---|---|---|---|---|---|---|
| 202,152 | Sept. 4 | 5 | 5 | Ascot Ord. ... ... | 80—90 | ... |
| 128,182 | July 3 | 5 | 5 | Do. 5 p.c. Pref. ... | 90—95 | ... |
| 31,035 | Aug. 21 | -/4⅛ | -/4⅛ | Associated Utilities 4 p.c. Pref. | 15/—17/- | ... |
| 100,000 | Dec. 18 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 90—95* | ... |
| 17,000 | Aug. 21 | 8 | 8 | Bognor Orig. Ord. 'A' ... | 105—115 | ... |
| 62,210 | ,, | 8 | 8 | Do. New Add. 'A' ... | 105—115 | ... |
| 87,160 | ,, | 7 | 7 | Do. New 7 p.c. max. ... | 100—110 | ... |
| 37,440 | July 31 | 10 | 10 | Cam. Univ. & Town 10 p.c. max. | 110—120 | ... |
| 125,970 | ,, | 7 | 7 | Do. 7 p.c. max. ... ... | 90—100 | ... |
| 39,025 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 80—90 | ... |
| 96,410 | July 17 | 4½ | 4½ | Cardiff 4½ p.c. Pref. ... ... | 92—97 | ... |
| 55,520 | July 31 | 6 | 6 | Colchester 6 p.c. Pref. ... ... | 95—100 | ... |
| 90,550 | Sept. 18 | 5 | 5 | Do. 5 p.c. Deb. ... | 100—105 | ... |
| 150,000 | July 31 | 4 | 4 | Croydon 4 p.c. Pref. ... ... | 70—75 | ... |
| 130,000 | June 19 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 75—80 | ... |
| 65,000 | Aug. 21 | 7⅛ | 7⅛ | Eastbourne 'A' 5 p.c. ... ... | 105—115 | ... |
| 198,000 | ,, | 6 | 6 | Do. 'B' 3½ p.c. ... ... | 90—100 | ... |
| 112,312 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 90—95 | ... |
| 130,000 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 95—105* | ... |
| 130,500 | Aug. 10 | 7½ | 7½ | Exeter New Ord. (£10) ... | 10—12 | ... |
| 24,000 | Aug. 21 | 8½ | 8½ | Gt. Yarmouth 8½ p.c. max. (£30) | 15—20 | ... |
| 59,400 | ,, | 7½ | 7½ | Do. 7½ p.c. max. (£30) ... | 10—15 | ... |
| 51,160 | Dec. 11 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 102—107* | ... |
| 152,600 | Sept. 4 | 9 | 8 | Guildford Cons. ... ... | 110—120 | ... |
| 54,055 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 90—95 | ... |
| 68,250 | Dec. 11 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 90—95* | ... |
| 156,690 | Aug. 21 | 7 | 7 | Hampton Court Cons. ... | 100—110 | ... |
| 86,046 | June 19 | ‡14½ | ‡5 | Holyh'd&N.W.G.&W.Cpn.Ord. | 13/6—15/6 | ... |
| 80,000 | Aug. 21 | 4 | 4 | Lea Bridge 4 p.c. Pref. ... ... | 65—75 | ... |
| 60,000 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... ... | 105—115 | ... |
| 94,876 | Dec. 18 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 75—80* | ... |
| 73,620 | Sept. 18 | 8⅛ | 8⅛ | Luton Cons. 'A' ... ... | 115—125 | ... |
| 187,960 | Sept. 18 | 5¼ | 4 | Mid Kent Ord. (£10) ... | 7½— 8½ | ... |
| 238,940 | July 31 | 10 | 10 | Oxford & District Ord. ... | 135—145 | ... |
| 47,112 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 85—95 | ... |
| 50,000 | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 100—105 | ... |
| 126,193 | Oct. 30 | 7½ | 7½ | Peterborough Ord. ... ... | 140—150 | ... |
| 64,990 | Sept. 18 | 7½ | 7 | Redditch Ord. ... ... ... | 100—110 | ... |
| 166,850 | July 31 | 8 | 8 | Romford Ord. ... ... ... | 110—120 | ... |
| 80,000 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 85—90 | ... |
| 44,800 | Sept. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 95—100 | ... |
| 25,570 | July 31 | 5½ | 5½ | Rugby 5½ p.c. Pref. ... ... | 95—105 | ... |
| 25,000 | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 100—105 | ... |
| 42,750 | Dec. 11 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 103—108* | ... |
| 110,950 | Aug. 21 | 8 | 8 | Ryde Ord. ... ... ... | 110—120 | ... |
| 270,086 | Sept. 4 | 7 | 7 | Slough Ord. ... ... ... | 100—110 | ... |
| 21,000 | Dec. 11 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 92—97* | ... |
| 28,872 | Nov. 6 | 5½ | 5½ | S. Midland Gas Cpn. Ltd. Ord. | 14/—16/- | ... |
| 28,866 | Sept. 18 | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 14/—16/- | ... |
| 117,228 | Aug. 21 | 7 | 5 | Swindon Cons. ... ... ... | 70—80 | ... |
| 60,425 | Dec. 18 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 92—97* | -3 |
| 64,380 | ,, | 5 | 5 | Torquay & Paignton 5 p.c. Pref. | 82—87* | -3 |
| 130,000 | Aug. 21 | 8 | 5 | Wakefield Ord. ... ... ... | 85—95 | ... |
| 81,650 | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 75—80 | ... |
| 82,000 | July 31 | 6 | 6 | Weymouth Ord. ... ... | 80—90 | ... |
| 273,626 | Aug. 21 | 7 | 7 | Wolverhampton Cons. Ord. ... | 95—105 | ... |
| 98,384 | ,, | 6 | 6 | Do. 6 p.c. Pref. ... ... | 105—115 | ... |
| 160,000 | Dec. 18 | 5½ | 5½ | Do. 5½ p.c. Red. Deb. ... | 100—105* | ... |
| 106,490 | Aug. 21 | 5½ | 5½ | Wrexham Ord. ... ... ... | 70—80 | ... |
| 90,000 | Dec. 18 | 5 | 5 | York 5 p.c. Red. Deb. ... ... | 95—100* | -2 |
| 133,640 | July 31 | 6½ | 6 | Yorktown (Cam.) 5 p.c. Cons. | 80—90 | ... |
| 120,000 | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 85—95 | ... |
| 35,000 | Dec. 18 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 103—108* | -2 |

## BRISTOL EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Dec. 15 | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 347,756 | July 31 | 6 | 5 | Bath Cons. ... ... ... | 107—112 | ... |
| 1,667,250 | ,, | 5 | 5 | Bristol, 5 p.c. max. ... ... | 97—100 | - |
| 120,420 | June 5 | 4 | 4 | Do. 1st 4 p.c. Deb. ... ... | 89—93 | ... |
| 415,250 | ,, | 4 | 4 | Do. 2nd 4 p.c. Deb. ... | 89—93 | ... |
| 328,790 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... ... | 110—113 | ... |
| 274,000 | July 31 | 5 | 5 | Newport (Mon.) Ord.... ... | 90—95 | ... |
| 13,200 | Sept. 4 | 8⅓ | 7 | Pontyp'l Gas & W. 10 p.c. 'A' | 12—13 | ... |
| 13,600 | ,, | 6 | 5 | Do. 7 p.c. 'B' ... ... | 10½—11 | ... |
| 40,000 | ,, | 6 | 5 | Do. 7 p.c. 'C' ... ... | 10½—11 | ... |
| 140,778 | July 31 | 5 | 5 | Weston-super-Mare Cons. ... | 93—98 | ... |
| 64,338 | June 19 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 90—95 | ... |
| 33,340 | ,, | 7⅓ | 7⅓ | Do. 7⅓ p.c. Deb. ... ... | 140—150 | ... |

## LIVERPOOL EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Dec. 15 | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 157,150 | July 31 | 6½ | 5 | Chester 5 p.c. Ord. ... ... | 100—103 | ... |
| 92,500 | June 5 | 4 | 4 | Do. 4 p.c. Pref. ... ... | 75—85 | ... |
| 36,430 | ,, | 3½ | 3½ | Do. 3½ p.c. Deb. ... ... | 86—89 | ... |
| 41,890 | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 96—100 | ... |
| 2,167,410 | Aug. 21 | 6 | 6 | Liverpool 5 p.c. Ord. ... ... | 99—101 | ... |
| 245,500 | June 19 | 5 | 5 | Do. 5 p.c. Red Pref. ... | 95—100 | ... |
| 306,083 | July 17 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 99—101 | ... |
| 106,280 | July 31 | 10 | 10 | Preston 'A' 10 p.c. ... ... | 174—184 | ... |
| 188,219 | ,, | 7 | 7 | Do. 'B' 7 p.c. ... ... | 126—136 | ... |

## NEWCASTLE EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Dec. 15 | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 122,577 | Aug. 21 | 8 | 8 | Blyth 5 p.c. Ord. ... ... | 115—120 | ... |
| 732,000 | Aug. 21 | 3 | 4 | Hartlepool G. & W. Cn. & New | 65—66 | ... |
| 2,061,315 | July 31 | 5¾ | 5 | Newcastle & Gateshead Con. | 18/6—19/—a | ... |
| 682,856 | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 87—89 | ... |
| 776,706 | June 5 | 3½ | 3½ | Do. 3½ p.c. Deb. ... ... | 79—81 | ... |
| 277,285 | April 24 | 5 | 5 | Do. 5 p.c. Deb. '43 ... | 98—103 | ... |
| 332,351 | Aug. 21 | 6 | 6 | Sunderland 6 p.c. max. ... | 110—120 | ... |

## NOTTINGHAM EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Dec. 15 | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 542,270 | Aug. 10 | 9 | 6 | Derby Con. ... ... ... | 100—110 | ... |
| 55,000 | June 19 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100—105 | ... |
| 20,000 | June 19 | 5 | 5 | Long Eaton 5 p.c. Pref. ... | 9—11 | ... |
| 80,000 | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 100—105 | ... |

## SHEFFIELD EXCHANGE

| Issue. £ | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Dec. 15 | Rise or Fall on Week |
|---|---|---|---|---|---|---|
| 10,000 | Aug. 21 | 10 | 10 | Great Grimsby 'A' Ord. ... | 170—180 | ... |
| 6,500 | ,, | 10 | 10 | Do. 'B' Ord. ... | 170—180 | ... |
| 79,000 | ,, | 10 | 10 | Do. 'C' Ord. ... | 160—170 | ... |
| 1,806,339 | Feb. 20 | 6½ | 6½ | Sheffield Cons. ... ... ... | 119—122 | ... |
| 95,000 | July 3 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 99—101 | ... |

a The quotation is per £1 of Stock.
* Ex. div. ‡ For year.

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WET AND DRY GAS METERS, PREPAYMENT METERS STATION METERS AND GOVERNORS.

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**ROBERT DEMPSTER & SONS,** LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. *Telegrams:* "Dempster, Elland." *Telephone:* Elland 2241, 2242 and 2243.

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## PLANT &c. (Second Hand) FOR SALE

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**FOR SALE—Sectional Steel Tank 35 ft.** by 20 ft. by 5 ft.: C.I. Sectional Tank 15 ft. by 15 ft. by 7 ft. 6 ins.: Weir Feed Pump 10½ in. by 7 in. by 16 in.: Motor driven Twin Cylinder Compressor 8 in. by 8 in., 100 lbs. w.p. 440 volts. D.C.

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50 Cort's ANTI-DIP 6-in. VALVES, in perfect condition.

One 20,000 cu. ft. per hour Waller EXHAUSTER, complete with 8 in. valves.

One 20,000 cu. ft. per hour Willy & Beale EXHAUSTER, complete with 8 in. valves.

One 20,000 cu. ft. per hour EXHAUSTER, made by Gwynne.

The above may be inspected on application to the undersigned.

J. POWDRILL,
General Manager.

**FOR SALE—**

RETORT BENCH FITTINGS, comprising 22 in. by 16 in. self-sealing mouthpieces, 8 in. ascension pipes, bridge-pipes, Hydraulic Mains, Corts Anti-Dips, Off-take Valves, Tar Tower, 12 in. Cowan Retort House Governor with Valves and By-pass, Producer Doors, etc., all from a Bench of three-settings, each of 8 through Retorts.

FIDDES - ALDRIDGE. — Simultaneous Charger-Discharger Machine — electrically driven.

LIVESEY WASHER. By Bailey Pegg & Company, about 5 ft. by 3 ft. 6 in. by 7 ft. 6 in., with 16 in. Cast Iron Inlet, Outlet and By-pass Valves and connections.

TOWER SCRUBBER. By Kirkham, Hulett and Chandler, about 28 ft. high by 4 ft. square, all Cast Iron, with 12 in. Cast Iron Inlet, Outlet and By-pass Valves and connections.

D. & L. CENTRIFUGAL WASHER-SCRUBBER. By Holmes, with electric motor drive and 18 in. Cast Iron Inlet and Outlet valves and connections.

STATION METER. By Parkinson.—Cast Iron Rectangular Case, about 40,000 cu. ft. per hour capacity with 14 in. Hydraulic Valves.

STATION METER.—Cast Iron Rectangular Case, about 80,000 cu. ft. per hour capacity.

STATION METER. By the Gas Meter Company.—Cast Iron Cylindrical Case, about 8 ft. 6 in. diameter, by 9 ft. (30,000 cu. ft. per hour capacity) with 8 in. Inlet and Outlet Valves and connections.

WECK PURIFIER VALVE.—18 in. Centre Valve—for four Purifiers, without Pipe connections.

The whole of the above Plant may be inspected at the works of the REDDITCH GAS COMPANY, to whom all enquiries for further particulars and offers for the plant, should be sent.

## CONTRACTS OPEN

### COUNTY BOROUGH OF STOCKPORT.

(GAS DEPARTMENT.)

**THE Gas Committee is prepared to** receive Tenders for the supply of its requirements in :—

(1) OILS.
(2) PREPAYMENT METERS.
(3) METER SKINS.
(4) TARRED YARN.
(5) C.I. PIPES AND SPECIALS.
(6) LEAD (GAS AND WATER) PIPING.
(7) TUBING AND FITTINGS.
(8) BRASS FITTINGS.
(9) TIMBER - TROUGHING AND COVERS.
(10) PIG LEAD.
(11) OXIDE OF IRON.
(12) DRYSALTERY.
(13) FLEXIBLE CONNECTORS AND TUBING.
(14) CEMENT.
(15) SAND.

For the Twelve months ending 31st March, 1941.

Schedules and Conditions of Order can be obtained on application to the Secretary and Accountant, Gas Department, Town Hall Annexe, Stockport.

Sealed Tenders, in plain envelopes, endorsed "Tender for....." are to be delivered not later than Saturday, 27th January, 1940, addressed to the Chairman of the Gas Committee, Town Hall, Stockport.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve the right to divide the Contract as may be found desirable.

FRANK KNOWLES,
Town Clerk.

Town Hall, Stockport.
Dec. 30, 1939.

### COUNTY BOROUGH OF MIDDLESBROUGH

(GAS DEPARTMENT.)

Laying of a 24-in. diameter GAS MAIN from the CLEVELAND IRON AND STEEL WORKS, SOUTH BANK, to the COMMERCIAL STREET GAS WORKS, MIDDLESBROUGH.

**TENDERS are invited for the above** work, and Contractors wishing to tender should forward their names and addresses to the Town Clerk, Middlesbrough, together with a deposit of £10 10s., when Specification, General Conditions and Bill of Quantities prepared by Mr. John W. Pallister, A.M.I.C.E., Gas Engineer and Manager, will be forwarded. The deposit is returnable on receipt of a *bona fide* tender.

Tenders will only be accepted from Firms who have had adequate experience in the laying of cast iron gas mains of equivalent size.

Tenders must be returned to the undersigned in a plain sealed envelope which must not bear any name or mark indicating the sender endorsed "Tender for Gas Main—Gas Works" not later than 9 a.m. on Friday, 19th January, 1940.

The Council do not bind themselves to accept the lowest or any Tender, and Reserve the right to accept the whole or part of any Tender, and all Contracts will be subject to the Standing Orders of the Council relating to Contracts so far as they are applicable.

PRESTON KITCHEN,
Town Clerk.

Municipal Buildings,
Middlesbrough.
Dec. 18, 1939.

## CONTRACTS OPEN (contd.)

### COUNTY BOROUGH OF MIDDLESBROUGH

(GAS DEPARTMENT.)

Delivery and Erection of STATION METER, of the Positive Displacement Type and with a Capacity of not less than 250,000 cubic feet of gas per hour.

**TENDERS are invited for the above** work, and Contractors wishing to tender should forward their names and addresses to the Town Clerk, Middlesbrough, together with a deposit of £2 2s., when Specifications and General Conditions prepared by Mr. John W. Pallister, A.M.I.C.E., Gas Engineer and Manager, will be forwarded. The deposit is returnable on receipt of a *bona fide* Tender.

Tenders must be returned to the undersigned in a plain sealed envelope which must not bear any name or mark indicating the sender, endorsed "Tender for Station Meter —Gas Works" not later than 9 a.m. on Friday, 19th January, 1940.

The Council do not bind themselves to accept the lowest or any Tender, and reserve the right to accept the whole or part of any Tender, and all Contracts will be subject to the Standing Orders of the Council relating to Contracts so far as they are applicable.

PRESTON KITCHEN,
Town Clerk.

Municipal Buildings,
Middlesbrough.
Dec. 18, 1939.

## APPOINTMENTS VACANT

### GRANTHAM GAS COMPANY

TECHNICAL ASSISTANT.

**APPLICANTS are thanked and informed** that an APPOINTMENT HAS BEEN MADE.

**JUNIOR TECHNICAL ASSISTANT** AND WORKS CHEMIST required above "reserved age."

Write, stating Wages required, and giving full particulars of education and training, to C. T. PRICE, GAS WORKS, HAMPTON WICK, KINGSTON-ON-THAMES.

### THE OXFORD AND DISTRICT GAS COMPANY.

DEPUTY ENGINEER.

**APPLICATIONS are invited for the** position of DEPUTY ENGINEER to the above company. Salary will be not less than £750 per annum, according to qualifications. Candidates must have had a good technical training and practical experience in modern methods of Gas-Works Construction and Gas Manufacture in Horizontal Retorts together with the Manufacture of Carburetted Water Gas.

Applications stating Age, with full particulars of Training and Experience, together with *copies* of three recent Testimonials to be sent to the Undersigned not later than January 16, 1940.

W. E. CATON, M.Inst.C.E.,
Managing Director and Chief Engineer.

Gas Works,
Oxford.
Dec. 22, 1939.

## APPOINTMENTS VACANT contd.

**REQUIRED immediately, RETORT** HOUSE MAINTENANCE FITTER, experienced in all Retort House running repairs. Knowledge of Electrical Equipment and/or Vertical Retorts an advantage.

Apply, giving full details and references, to the undersigned.

C. H. CHESTER,
Director, General Manager and Secretary.

Swindon United Gas Company,
43, Regent Street,
Swindon.

### SIDMOUTH URBAN DISTRICT COUNCIL.

SENIOR CLERK—GAS DEPARTMENT.

**THE services of a SENIOR CLERK,** for purely clerical work and not for collection of incomes, are required at the Gas Showrooms.

Form of application can be obtained from Mr. H. Burgess, Gas Engineer and Manager, at the Gas Showrooms, High Street, Sidmouth.

Applications in the envelope provided must be received by the undersigned not later than noon on Friday, the 12th January, 1940.

R. PICKARD,
Clerk of the Council.

Council Offices,
Sidmouth.
Dec. 22, 1939.

## COMPANY NOTICE

### THE GAS LIGHT AND COKE COMPANY.

3½% REDEEMABLE PREFERENCE STOCK, 1970.

**NOTICE is Hereby Given** that the TRANSFER BOOKS of this Company so far as they relate to the above-mentioned Stock WILL BE CLOSED at 4 o'clock p.m. on Friday the 5th day of January, 1940, and WILL BE RE-OPENED on the morning of Saturday the 6th January, 1940.

By Order,
BRIAN WOOD,
Secretary.

Chief Office, Horseferry Road,
Westminster, S.W.1.
Dec. 20, 1939.

GAS SALESMAN'S POCKET BOOK 1940

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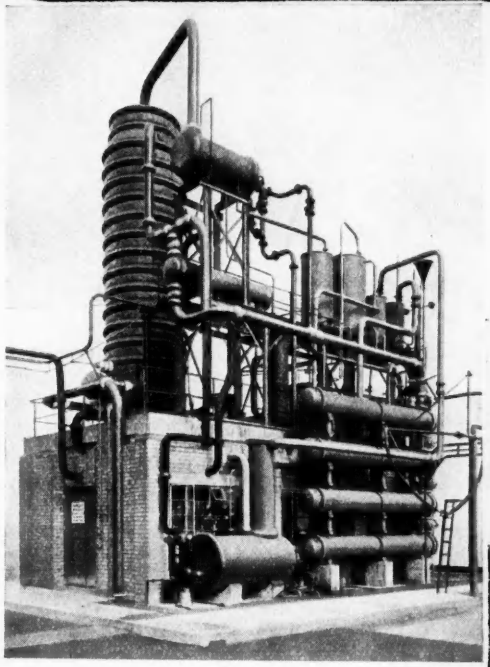
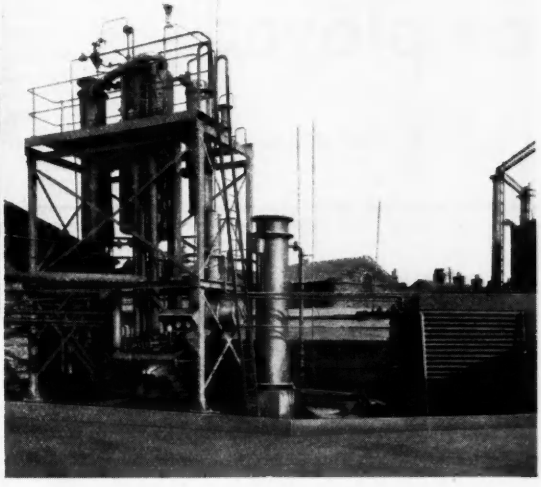


Rochester, Chatham and Gillingham Gas Co., Rochester Works (C. Valon Bennett, Esq., M.I. Mech. E., M. Inst. Gas E., Engineer and Manager).



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**The design of these plants is covered by the patents of the Gas Light and Coke Co., London, and W. C. Holmes & Co. Ltd.**

**Experience gained on plants in operation varying in capacity from 750,000 cu. ft. daily to 8,000,000 cu. ft. daily, shows that organic sulphur compounds can be reduced to—**

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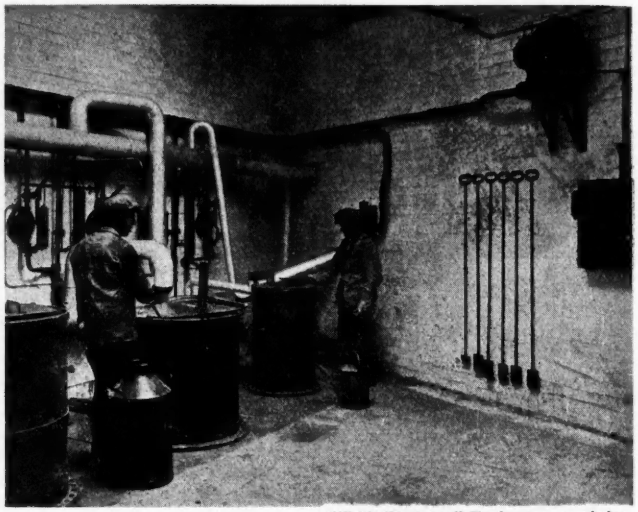

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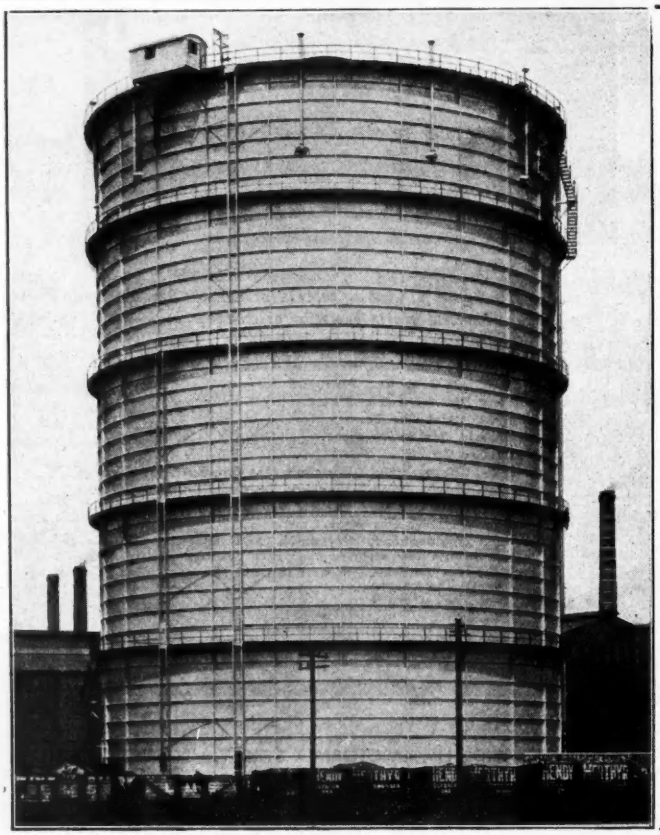

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